UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

MAY, 1885.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY,

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1885.

List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of May, 1885.

Name of vessel.	Observers.
Allan Line.	
Br. s. s. Circassian	Capt. Wm. Richardson.
Grecian	C. E. Le Gallais.
Prussian	Alex. McDougall.
Scandinavian	John Park.
Siberian	R. P. Moore.
American Line.	
Br. s. s. British Princess	E. H. Freeth.
Am. Illinois	Geo. H. Dodge.
Indiana	R. W. Sargent.
Br. Lord Clive	P. Urquhart.
Anchor Line.	
Br. s. s. Anchoria	J. J. Small.
Australia	Alex. McRitchie.
City of Rome	R. D. Munro.
Devonia	Hugh Young.
Elysia	James Brown.
Ethiopia	John Wilson.
Trinacria	Geo. Mitchell.
Anglo-Australian S. S. Co.	
Br. s. s. Port Phillip	Geo. Dulling.
Atlas Line.	
Br. s. s. Ailsa	Jno. W. Sansom.
Alvo	David Williams.
Span. Andes	A. de Amezaga.
Athos	Horatio Low.
Booth's S. S. Co. (limited).	
Br. s. s. Cyril	J. H. Johnson.
Bristol-City Line.	
Br. s. s. Brooklyn City	W. Fitt.
Lecudaff City	T. L. Weiss.
California and Mexican S. S. Co.	
Am. s. s. Newbern	E. T. Rogers.
Cunard Line.	
Br. s. s. Aurania	W. H. P. Hains.
Catalonia	Alex. McKay.
Cephalonia	Henry Walker.
Gallia	M. Murphy.
Pavonia	B. Woolfenden.
Scythia	P. Whealan.
General Trans-Atlantic Steamship Co.	
Fr. s. s. St. Laurent	M. de Jousselin.
Guion Line.	
Br. s. s. Wyoming	C. L. Rigby.
Hamburg-American Line.	
Ger. s. s. Bohemia	R. Karlowa.
Frisia	E. Kopff.
Gellert	W. Kühlewein.
Hammonia	H. F. Schwensen.
Lessing	B. Voss.
Moravia	O. Pezoldt.
Rhaetia	H. Vogelgesang.
Rugia	A. Albers.
Wieland	C. Hebich.
Westphalia	H. Barends.
Inman Line.	
Br. s. s. City of Berlin	Francis S. Land
City of Chicago	Fred. Watkins.
City of Montreal	Arthur Redford.
City of Richmond	A. W. Lewis.
Johnson Line.	
Br. s. s. Nessmore	John Inch.
Lamport & Holt's Steamship Company.	
Br. s. s. Biela	Fred. Graham.
Hevelius	John Carroll.
Belg. s. s. Hipparchus	Wm. Kelly.
Br. s. s. Dalton	J. Russell.
Leyland Line.	
Br. s. s. Venetian	W. H. Trant.
Virginian	M. Fitt.
Liverpool, Brazil and River Plate Steam Navigation Company.	
Br. s. s. Olbers	James Clarke.
Mallory Line.	
Am. s. s. Alamo	Sam. Risk.
Lampasas	M. B. Crowell
San Marcos	A. C. Burrows.
Mediterranean and New York S. S. Co.	
It. s. s. Archimede	Domenico Viola.
Gottardo	G. Diliberto.
Indipendente	P. Pirandello.
Miss. & Dominion S. S. Co.	
Br. s. s. Brooklyn	Geo. S. Dale.
Ontario	W. P. Couch.
Toronto	Jas. McAuley.
Morgan's La. & Texas R. R. & S. S. Co.	
Am. s. s. Chalmette	Robt. B. Quick.

Name of vessel.	Observers.
National Line.	
Br. s. s. Canada	Capt. Wm. Pearce.
Egypt	J. Sumner.
Greece	Thos. Foote.
Holland	Geo. Cochrane.
Spain	W. A. Griffiths.
New York and Cuba Mail S. S. Co.	
Am. s. s. Cienfuegos	C. M. Faircloth.
N. Y., Havana & Mexican Mail S. S. Co.	
Am. s. s. City of Alexandria	J. W. Reynolds.
North German Lloyd Steamship Co.	
Ger. s. s. America	G. Meyer.
Donau	R. Ringk.
Eider	H. Helmers.
Elbe	F. Hamelmann.
Ems	W. Willigerod.
Fulda	O. Heimbruch.
Habsburg	Fr. Pfeiffer.
Hermann	H. Baur.
Hohenstaufen	H. Winter.
Hohenzollern	A. Meier.
Main	H. Christoffers.
Neckar	R. Busius.
Nürnberg	A. Jaeger.
Rhein	Th. Jüngst.
Salier	C. Wiegand.
Strassburg	H. Heincke.
Werra	J. Barre.
Weser	H. Bruns.
Ocean Steamship Company.	
Am. s. s. City of Augusta	K. S. Nickerson.
Occidental & Oriental S. S. Company.	
Br. s. s. Oceanic	John Metcalf.
Oceanic Steamship Company.	
Am. s. s. Alameda	H. G. Morse.
Mariposa	H. M. Hayward.
Oregon Railway and Navigation Co.	
Am. s. s. City of Chester	Thomas Wallace.
Columbia	Fred. Bolles.
Oregon	E. Polemann.
Pacific Coast Steamship Company.	
Am. s. s. Orizaba	John N. Ingalls.
Santa Rosa	Chas. B. Johnson.
State of California	G. Debney.
Pacific Mail Steamship Company.	
Br. Australia	R. C. Ghest.
Am. City of New York	Robt. R. Searle.
City of Para	L. Dexter.
City of Peking	G. G. Berry.
City of Rio Janeiro	Wm. B. Cobb.
City of Sydney	H. C. Dearborn.
City of Tokio	Com. Jefferson Maury.
Colima	Capt. W. B. Seabury.
Granada	M. Connolly.
San Blas	Thos. Chapman.
Zealandia	Henry Webber.
Quebec Steamship Company.	
Br. s. s. Muriel	G. S. Locke.
Orinoco	Jas. S. Garvin.
Red Star Line.	
Belg. s. s. Belgenland	W. A. Beynon.
Nederland	Allen J. Griffin.
Pennland	Rud. Weyer.
Rhynland	J. C. Jamison.
Switzerland	H. Buschmann.
Waesland	J. Ueberweg.
Westernland	Com. W. G. Randle.
Rotterdam Line.	
Dtch. s. s. Edam	Capt. J. H. Taat.
Leerdam	P. Stierendregt
P. Caland	T. H. Bonjer.
W. A. Scholten	G. J. Vis.
Zaandam	E. M. Chevalier.
Royal Mail Steam Packet Company.	
Br. s. s. Gaudiana	C. W. Hanslip.
Minho	Walter Chapman.
Royal West Indian Mail Steamship Co., of Amsterdam.	
Dtch s. s. Oranje Nassau	J. A. J. Lacrooy.
State Line.	
Br. s. s. State of Nebraska	A. G. Brae.
State of Nevada	G. Moodie.
Thingvalla Line.	
Dan. s. s. Geiser	F. V. Schierbeck
Thingvalla	S. T. H. Laub.
U. S. and Brazil Mail S. S. Co.	
Am. s. s. Finance	Ch. Off. James Lord.
Warren Line.	
Br. s. s. Iowa	Capt. Samuel Walters.

Name of vessel.	Observers.
White Cross Line.	
Dtch. s. s. De Ruyter	Capt. J. J. Brarens.
White Star Line.	
Br. s. s. Adriatic	H. Parsell.
Baltic	R. E. Bence.
Britannic	H. Perry.
Celtic	Benj. Gleadell.
Germanic	C. W. Kennedy.
Republic	P. J. Irving.
Wilson Line.	
Br. s. s. Chicago	J. W. Jones.
Galileo	Richard Potter.
Marengo	J. H. Malet.
Otranto	F. Kerr.
Rosario	Lieut. Rogers, R. N. R.
Winsor Line.	
Am. s. s. Norman	Capt. H. W. Googins.
Saxon	S. W. Snow.
Miscellaneous.	
Br. s. s. Camden	S. R. Chandler.
Castleford	C. Gray.
Edith Godden	John H. Bennett.
Effective	H. S. Mitchelson
Kairos	Thos. Liddle.
Lord Lansdowne	C. H. Baskfill.
Phoenix	Benj. Davies.
Peconic	John Jenkin.
Portuense	Fredk. Hervs.
Span. Valencia	M. Santamarina.
Br. Vindolana	Thos. Harrison.
Warwick	P. F. Lobbett.
"New York Herald Weather Service."	
Am. s. s. Acapulco	W. G. Shackford.
Br. Adriatic	H. Parsell.
Ailsa	J. W. Sansom.
Albano	H. R. Hughes.
Alene	E. J. Seiders.
Alvo	D. Williams.
Aurania	W. H. P. Hains.
Baltic	Robt. E. Bence.
Belg. Belgenland	W. A. Beynon.
Br. Britannic	H. Perry.
Carn Marth	Ch. off. W. C. Boynes.
Am. Chalmette	Capt. Robt. B. Quick.
City of Alexandria	J. W. Reynolds.
Br. City of Berlin	Francis S. Land.
City of Chicago	Fred. Watkins.
City of Chester	H. Condron.
City of Richmond	A. W. Lewis.
Am. Colon	Chas. C. Lima.
Crescent City	Jas. L. Lockwood.
Ger. Eider	H. Helmers.
Br. Elysia	James Brown.
Ger. Ems	Ch. Leist.
Br. Gallia	M. Murphy.
Dan. Geiser	F. V. Schierbeck.
Br. Ivanhoe	John Cameron.
Dtch. P. Caland	T. H. Bonjer.
Belg. Pennland	R. Weyer.
Br. Republic	P. J. Irving.
Belg. Rhynland	J. C. Jamison.
Am. San Marcos	Ch. Off. A. B. Connor.
Saratoga	Capt. John McIntosh.
Fr. St. Laurent	M. de Jousselin.
Belg. Switzerland	H. Buschmann.
Dtch. W. A. Scholten	G. Bakker.
Belg. Waesland	J. Ueberweg.
Westernland	Com. W. G. Randle.
Br. Wisconsin	Capt. Edw. Bentley.
Sailing vessels.	
Am. sc. Abbie H. Gheen	W. W. Gheen.
bk. Albemarle	W. H. Forbes.
Nor. bk. Alpha	O. C. Grönn.
Am. sc. Annie R. Lewis	L. L. Lewis.
Ger. bk. Betty	S. Wohlmuth.
Br. Bonny Doon	J. S. Cole.
Br. Corisande	Daniel Thoms.
Francesco Garguilo	John McDonald.
Am. Gamaliel	Chas. S. Powell.
sc. George W. Lochner	J. C. Wiltbank.
Ger. sp Hedwig	Th. Minssen.
Am. sc. James H. Gordon	W. Lawrence.
James Slater	James L. Tooker.
bkt. Levanter	A. F. Vesper.
bg. L. F. Munson	Jas. A. Smith.
Br. Lilian	H. F. Schive.
Ger. Lina	J. Witte.
Am. sc. Maggie Abbott	D. C. McIntosh.
bg. Mary Fink	Dan'l B. Darrah.
sc. Mary Nowell	Wm. M. Lank.
sc. Maude Snare	E. W. Snare.
bk. Mohican	Benj. F. Berry.
sc. Nelson Bartlett	Samuel Watts.
Nor. bk. Nordcap	E. Salvesen.
Qvos	Gunder Olsen.
Am. sc Sarah D. J. Rawson	Thos. D. French.
Am. bk. Spotless	Chas. E. Myrick.
sc. Stephen Bennett	William Douglas.
bk. Templer	R. Roberts.
Nor. bk. Tros	Severin Brager.
Ger. sp. Union	H. Fokken.
Am. sc. Walter L. Plummer	V. C. Plummer.

MONTHLY WEATHER REVIEW.

VOL. XIII. WASHINGTON CITY, MAY, 1885. No. 5.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during May, 1885, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given, and their approximate paths shown on chart i.

Phenomenally large masses of ice, both field and bergs, have been observed in the Atlantic during the month. On referring to the chart it will be seen that the area of the ice-region is much greater than is usual for the month of May.

The number of atmospheric depressions traced on chart i. and described under "Areas of low barometer" is seven, or two less than the average number for May during the last eleven years.

The severest local storms and tornadoes of the month were those which occurred during the prevalence of low areas v. and vi., on the 15–16th, and 24–25th, respectively.

Destructive freshets occurred in Kansas, Nebraska, and Texas, causing great damage to the growing crops and loss of stock.

As in April, the mean temperature exhibits no marked departures from the normal. The month was slightly warmer than the average in the Pacific coast districts, and slightly colder than the average in all districts east of the Rocky mountains, except in the upper Ohio valley, northern New England, and along the Atlantic coast from Virginia to Florida, where the mean temperature was normal or slightly above.

The most important features in connection with the monthly precipitation were the marked excess over the average in the south Atlantic states and the Rio Grande valley, and the large deficiency in the northern slope, extreme northwest, upper lake region, and throughout the Mississippi valley.

Temperature and rainfall observations in the cotton region were resumed May 1st. In this REVIEW will be found a table showing the means for the several districts, with the May averages for the three preceding years.

In the preparation of this REVIEW the following data, received up to June 20th, 1885, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-nine Signal Service stations and sixteen Canadian stations, as telegraphed to this office; one hundred and sixty-eight monthly journals and one hundred and sixty-five monthly means from the former, and sixteen monthly means from the latter; two hundred and eighty-eight monthly registers from voluntary observers; forty-five monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly reports from the New England Meteorological Society, and from the local weather services of Alabama, Georgia, Indiana, Iowa, Louisiana, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The distribution of mean atmospheric pressure for May, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii.

The mean pressure is 29.95, or above, along the middle Pacific coast, in Oregon and Washington Territory, over a small area including portions of Georgia and South Carolina, in Nova Scotia, New England, and portions of the lower lake region and middle Atlantic states. But four stations report monthly barometric means of 30.0 or above, viz: Fort Canby, Washington Territory, and Roseburg, Oregon, 30.0; Halifax, Nova Scotia, 30.01, and Yarmouth, Nova Scotia, 30.02. An area of barometric minima is shown in southern Arizona, where the monthly barometric means are below 29.75, the lowest being 29.73 and 29.74, respectively, at Forts Grant and Thomas. In the central and southern Rocky mountain districts, Rio Grande valley, and over portions of the upper lake region and upper Missouri valley the mean pressure is 29.9, or below.

As compared with the mean pressure for the preceding month, an increase of .01 to .07 occurs in northern New England and the Maritime Provinces. In all other parts of the country the barometric means are lower than for April. The deficiency exceeds .10 in the southern plateau, upper Missouri valley, and over an area extending from the lake region to the south Atlantic and east Gulf coasts. In the remaining districts the deficiencies vary from .01 to .10.

The departures from the normal pressure are given in the table of miscellaneous meteorological data; they are also shown on chart iv. by lines connecting stations of equal departure. The pressure is above the normal over the central and southern Rocky mountain districts, and from southeastern Montana to the lower Missouri valley; along the New England coast it is normal, and in all other portions of the country it is below the normal. The departures above the normal nowhere exceed .05, and, except at Santa Fé, New Mexico, they vary from .01 to .03. The departures below the normal are .05 or less, except in the north and middle Pacific coast regions and over an area extending from the upper lakes southeastward to the Atlantic and east Gulf coasts.

The monthly barometric ranges at the various stations of the Signal Service are given in the table of miscellaneous data. In the southern portions of California and Arizona the ranges vary from .24 to .29; on the north Pacific coast, in the central Rocky mountain districts, and along the Gulf coast, they vary from .30 to .50; they exceed .70 in the Ohio valley and in the northern districts from Dakota eastward to the

Atlantic coast. The following stations report the largest monthly ranges: Eastport, Maine, 1.14; Marquette, Michigan, .98; Mount Washington, New Hampshire, .94.

AREAS OF HIGH BAROMETER.

Seven areas of high barometer passed over the United States during the month of May. Four of these were first observed in the British Northwest Territories; two approached from the north Pacific coast; and one was apparently a secondary high area which formed within the limits of stations east of the Mississippi, and passed eastward with increasing pressure, until it disappeared east of Nova Scotia. The following is a general description of these high areas, and the direction of movement and the most important changes observed during their transit over the United States:

I.—This high area was advancing from the region north of Dakota on the morning of the 1st, attended by freezing weather along the line of the northern boundary of the United States from Lake Superior to Montana. It extended over the northwest and upper lake region during the 1st and 2d attended by cold, fair weather, the general direction being almost to the south during the 2d and 3d, while the storm immediately to the eastward was moving northward. As this area approached the south Atlantic coast, it became less clearly defined and finally disappeared without causing any marked changes in temperature in southern or eastern districts.

II.—This area, although first marked central north of Montana, probably advanced from the north Pacific coast. It remained central in the region north of Montana and Dakota from the 7th to 10th, the retardation in that region being due to the development of a severe storm in the lake region, which remained almost stationary during the 7th, 8th, and 9th. While this storm was central in the lake region, the high area extended southward over the eastern Rocky mountain slope districts as far as the valley of the Rio Grande, causing dangerous northerly winds on the west Gulf coast on the 8th. The barometer continued highest north of Montana, but the direction of the wind at stations south of the Missouri valley shows that a secondary high area formed over Kansas and Indian Territory on the afternoon of the 8th. Very heavy rains, followed by generally clear weather and northerly winds, occurred along the west Gulf coast immediately after the formation of this secondary high area. These conditions prevailed over the districts of the central valleys on the 11th, when this high area had disappeared from the northwest and was faintly defined in Tennessee. Previous to this date the movement was southeasterly, attended by decreasing pressure near the centre, and after this date the direction of movement was to the north of east, attended by increasing pressure as it passed over the north Atlantic coast line and Nova Scotia. It disappeared on the 14th.

III.—A high area with slight intensity was developed over the lower lake region on the 14th. It remained nearly stationary and extended over the regions east of the Mississippi on the 15th, attended by fair weather, and then moved eastward on the 16th and 17th, the pressure increasing as it passed over the north Atlantic.

IV.—This was the most northerly area observed during the month, and its centre was at no time within the limits of the United States. The morning report of the 17th shows the advance of this area far to the north of Manitoba; it moved to the southeastward on the 18th, 19th and 20th, causing cool north to east winds in the lake region. It was central in the lower Saint Lawrence valley on the 21st, and afterwards it passed over New England and the Maritime Provinces. The pressure increased as it approached the Atlantic coast and reached its maximum on the morning of the 22d, when the centre was near and to the south of Halifax.

V.—This area appeared on the north Pacific coast at midnight of the 21st, and the centre of greatest pressure remained west of the coast line until the morning of the 23d, although the morning report of that date showed a general increase of pressure from the Rocky mountains westward to the Pacific coast. It moved southeastward during the 24th and 25th, becoming less clearly defined, and disappearing as a high area before reaching the Mississippi valley. It was preceded by general rains on the north Pacific coast and heavy local rains on the middle and southern slopes of the Rocky mountains.

VI.—The morning report of the 26th gave the first indications of the approach of this area from the regions north of of Manitoba. It moved southeastward over a course similar to that described as number iv., passing north of the lake region on the 27th and crossing the Saint Lawrence valley and New England on the 28th, causing generally cool and fair weather in these districts. It was central off the New England coast on the morning of the 29th, and during that day it disappeared rapidly in advance of a low area then moving from the lake region.

VII.—This area appeared on the north Pacific coast on the 26th, but did not develop sufficient energy to pass eastward of the Rocky mountain stations. It apparently moved eastward over Washington Territory and western Montana on the 27th and 28th and extended over the Rocky mountain districts on the 29th; the barometer, however, remained highest on the north Pacific coast, where it continued high until the close of the month.

AREAS OF LOW BAROMETER.

Seven areas of low barometer have been traced over or near the United States during the month of May. These storms generally developed in the Rocky mountain region, and, while five of them apparently had their origin on the Pacific coast or in the plateau region, they were not sufficiently well-defined to render it possible to trace them west of the 105th meridian. The movement of these low areas west of the Mississippi was irregular, and, in many cases, it was difficult to locate the centre of disturbance. Numerous secondary depressions were formed which disappeared quickly and their movements are therefore not traced upon the chart. It will be seen from chart number i. that the low areas traced during the month moved generally to the northeast after passing the Mississippi valley, and that the direction of movement, when to the westward of that valley, was irregular, but inclined to the southeast.

The following table gives the latitude and longitude in which each area was first and last observed, and the average hourly velocity:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long W.	
	° ′	° ′	° ′	° ′	
No. I	49 00	104 00	51 00	63 00	31.0
II	52 00	99 00	{ 52 00 / 41 00	{ 99 00 / 67 00	14.0
III	37 00	76 00	41 00	67 00	15.0
IV	43 00	102 00	51 00	89 00	33.0
V	43 00	94 00	46 00	67 00	31.0
VI	52 00	104 00	53 00	63 00	26.0
VII	43 00	99 00	48 00	73 00	21.0
Mean hourly velocity					24.4

I.—This storm, as described in the last REVIEW, had originated in Colorado and passed directly eastward to the upper Ohio valley, where it was central on the morning of the 1st as a well-defined cyclone of slight energy. It moved directly eastward over the middle Atlantic states, causing severe gales on the middle Atlantic coast on the 1st, and when the centre was near the coast the course changed to northerly. During the 2d it passed along the New England coast with increasing energy, the barometer falling to 29.19 at Eastport, Maine, near the centre, on afternoon of the 2d. The northerly course continued until its centre passed to the north of Anticosti, and then apparently changed to the northeast. This storm was most severe while the centre was passing along the middle Atlantic and New England coasts; it developed slight energy while passing over the continent and was apparently filling up when last observed on the morning of the 3d.

II.—This low area moved southward from the region north of Manitoba on the 4th; it was central in Minnesota on the afternoon of that date, and by midnight it had extended over the upper lake region and Mississippi and Missouri valleys as an elliptical area, the longer axis being nearly east and west. Light rains prevailed in the districts north of the Ohio valley and in the northwest on the morning of the 5th, when the centre of disturbance was over Lake Michigan. The elliptical form continued but the longer axis was turning toward the northeast. The afternoon report of the 5th showed that this area had divided, one area being central north of Lake Huron and one in Indian Territory, and the midnight chart exhibited three low areas, one in Arkansas, one in Illinois and one over Lake Huron, attended by rain from the Gulf coast northward to the lake region. The succeeding report of the 6th indicated that these secondary areas had united in the central Ohio valley and again separated, the principal area moving to the north of the lake region, and the secondary disturbance passing to the south Atlantic coast and thence northeasterly. The principal area, when central over Lake Superior, increased greatly in energy, owing to the advance of high area number ii., and severe gales occurred on the upper and lower lakes, attended by general rains or snow at the northern stations. During the 8th and 9th, after passing northward from the Ohio valley, this storm apparently moved slightly to the westward before taking up the usual northeasterly course. It increased in area and lost energy after leaving the lake region and disappeared to the northeastward on the 10th.

III.—This storm was at no time within the limits of the stations of observation, but its movement along the Atlantic coast from the 12th to the 15th can be approximately traced from barometric changes observed, and the direction and velocity of wind at the coast stations. Very heavy rains occurred on the North Carolina coast on the night of the 12th, and severe northerly gales were reported from this coast on the 13th. These gales extended over the middle Atlantic and southern New England coasts on the 14th, the wind reaching a velocity of fifty miles northeast at Block Island, Rhode Island, and forty-four miles at Boston, Massachusetts, between afternoon and midnight of the 14th. The succeeding reports of the 15th indicate that this storm did not pass over the Atlantic, but that it disappeared by gradual rise in the barometer, when the centre was near Nova Scotia.

IV.—This low area resulted from an extended depression covering the mountain districts during the 12th, 13th, and 14th. There was a gradual movement of this extended low area to the eastward and by the afternoon of the 15th the trough of low pressure extended from Texas northward to the British possessions. Two areas of depression were well defined on the midnight weather chart of the 15th, one central in northeastern Dakota and the other central in Kansas. This storm was accompanied by very heavy rains in the central Missouri valley and eastern Dakota on the 15th. It moved directly northeast and passed north of the lake region, disappearing during the 16th, attended by strong south to west winds in the upper lake region.

V.—This storm probably originated in the southwest and although its centre cannot be located at each consecutive tri-daily report, it is probably a development of a secondary area referred to in number iv. It is first marked as central in Iowa on the morning of the 17th. The barometer was low in all districts from the lower Mississippi valley westward to the Pacific coast and it was lowest in Arizona, but the winds in the northwest indicated the development of this storm which passed eastward from Iowa over the lake region, attended by light rain in the northern states and light to fresh winds in the lake region. This depression increased in size as it approached the coast, the barometer remaining about stationary and the winds becoming light and variable. It disappeared in the northeast with indications of decreasing energy.

VI.—This disturbance was first marked as central north of Dakota on the afternoon of the 22d; it had previously extended over the mountain districts to the westward, and it probably originated on the Pacific coast. It remained north of Minnesota until the afternoon of the 23d, when it moved southward to southern Minnesota, the depression being in form of a barometric trough extending southward to Texas, inclosed between high areas which covered the Atlantic coast and the Rocky mountain districts. The morning report of the 24th shows three minor depressions within this barometric trough, one central in Indian Territory, one in southern Minnesota, and the third northeast of Manitoba. These minor depressions disappeared during the 24th, apparently uniting with the central disturbance and passing over the upper lake region to the northeast, accompanied by fresh and brisk winds in the lake region, and general rains in the northern and local rains in the southern states. This storm continued its course northeastward north of the Saint Lawrence valley during the 25th and 26th with decreasing pressure at the centre, but without causing severe gales, owing to the slight gradient which was due to the extension of the low area.

VII.—Previous to the development of this disturbance in the central Missouri valley on the afternoon of the 28th, the barometer had been low in the region south of Nebraska and Wyoming, and the reports indicate that a depression with slight energy moved from Colorado eastward to the Missouri valley during the 27th; when the centre was located near Yankton, Dakota, on the afternoon of the 28th, the depression extended southeastward to the lower Ohio valley and a secondary distubance, which had disappeared at the succeeding report, appeared to be central in Missouri. The storm moved southeastward over the Mississippi valley, causing general rains in all districts and strong north to east winds on the west Gulf coast. It was elliptical in form and enclosed by the isobars for 29.7, 29.8, and 29.9, on the morning of the 29th, when central near Keokuk, Iowa. This general form continued during the two succeeding reports, when the storm-centre reached its most southerly point, near Champaign, Illinois, after which it moved rapidly northeastward to the Saint Lawrence valley, where it was central at the close of the month as a depression of slight energy.

NORTH ATLANTIC STORMS DURING MAY, 1885.

[*Pressure expressed in inches and in millimetres; wind-force by scale of* 0-10.]

The paths of the depressions that have appeared over the north Atlantic ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ship's logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports furnished through the co-operation of the "New York Herald Weather Service," and from other miscellaneous data received at this office up to June 21st, 1885.

Of the ten depressions shown on the chart, that traced as number 8 appears to have been a continuation of a storm which entered the Atlantic from the North American continent; number 5 appeared off the South Carolina coast on the 10th, and dispersed on the following day when south of Nova Scotia; numbers 3 and 4 developed over the Banks of Newfoundland and occupied mid-ocean during the first decade of the month, finally disappearing in the neighborhood of the Azores; number 10 appeared near N. 50°, W. 40°, on the 28th, and may have been a continuation of a disturbance which left the Labrador coast on the 26th, its centre, on the 27th, being far beyond the limits of the marine observations. Numbers 2 and 9 appeared between N. 45° and 50° and W. 30° and 35°; the former moving eastward to the Bay of Biscay and the latter northeastward beyond N. 55°, W. 20°. The remaining depressions, numbers 1, 6, and 7, appeared between W. 20° and the British coasts, having apparently approached from the northwestward.

The general direction of movement of the storm-centres during May, 1885, was east-northeasterly, excepting those which appeared first near the British coasts; these moved southeastward. During the first and last decades of the month the at-

mospheric pressure over the Atlantic, between the fortieth and fiftieth parallels was comparatively low, and strong breezes to gales with generally unsettled weather prevailed; during the second decade areas of high pressure occupied the above-mentioned region, and generally pleasant weather was reported. The severest storms of the month occurred during the passage of the depressions traced as numbers 3, 4, and 9. Dense fogs prevailed over the region from W. 40° to the American coasts.

The following are descriptions of the depressions charted:

1.—This depression appeared on the 1st, near W. 20°; on that date the s. s. "City of Chicago," F. Watkins, commanding, in N. 50° 48′, W. 20° 30′, had a w. gale of force 7, with barometer reading 29.28 (743.7), and the bark "Alpha," Ole Grönn, commanding, in N. 57° 20′, W. 23° 20′, had barometer 29.5 (749.3), wind ne., force 5, squally weather; at the same time strong sw. to w. breezes or moderate gales prevailed over the English channel and south of Ireland. On the 2d, the storm-centre was off the Irish coast with lowest reported pressure 29.24 (742.7); during the day the disturbance moved southeastward and on the 3d was central to the southwest of Ireland, attended by strong nw. and w. winds in the southwest quadrant; during its progress the winds shifted to east over the British Isles and to south and southwest over the Bay of Biscay and along the French coasts. On the 4th the depression apparently entered northern France.

2.—This depression was shown near N. 47°, W. 34° on the 3d; it moved slowly eastward during the 4th, the barometer ranging from 29.65 (753.1) to 29.75 (755.6), and by the 5th the centre of disturbance had reached N. 47°, W. 17°, where the pressure was below 29.55 (750.6). On the 6th the depression occupied the Bay of Biscay, the pressure near the centre being less than 29.4 (746.7). During the passage of this depression the wind did not exceed the force of a moderate to strong breeze.

3.—During the 2d and 3d, a storm of considerable energy (low area i.) passed northward over the Maritime Provinces and the Gulf of Saint Lawrence, causing a decrease of pressure over the ocean eastward to the Banks of Newfoundland. After its passage the pressure over the Banks varied from 29.55 (750.6) to 29.7 (754.4), with moderate to strong w. and sw. winds and unsettled weather. By the morning of the 5th a storm-centre had developed and taken up an easterly movement and was then near N. 45°, W. 40°; the s. s. "Baltic," R. E. Bence, commanding, in N. 45° 10′, W. 41° 30′, had barometer 29.52 (749.8), with light variable winds and showery weather, while the s. s. "Fulda," O. Heimbruck, commanding, in N. 44° 1′, W. 42° 16′, had a w. gale of force 7, with barometer 29.6 (751.8). Vessels to the eastward of the thirty-ninth meridian had east and southeast winds, blowing with the force of a strong breeze to moderate gale. On the 6th the centre of this depression was apparently near N. 35°, but after this date it became ill-defined and the disturbance probably merged in number 4, an important and extensive depression which was moving eastward from the Banks and south of the track of number 3.

4.—This disturbance, which was attended by some of the heaviest gales of the month, appeared as a well-defined storm-centre on the 6th, near N. 42°, W. 50°, with the barometer down to 29.0 (736.6).

The following are some of the reports relating thereto:

The s. s. "Rhynland," J. C. Jamison, commanding, reported: "at 11 h. 29 m. on May 5th (Greenwich date and time), the barometer read 29.6 (751.8), moderate gale from nne., increasing rapidly to a hurricane; at 15 h. 26 m., barometer 29.4 (746.2), nne. hurricane with terrific squalls of hail and torrents of rain; very high, confused sea, sweeping the decks fore and aft; thunder and lightning almost continuous. Kept the ship (sse.) before the dominating nnw. sea, the masts, yards, and all the rigging being bright with electricity; each mast-head and all the yard-arms showed a brilliant ball of light, which continued for four hours. At 18 h. 10 m., in N. 40° 27′, W. 50° 54′, the barometer read 29.2 (741.7); wind and sea hauling to nnw., weather continuing same as before, with thick fog or mist. At 20 h. lightning struck the funnel twice at an interval of about five minutes, resembling in sound a volley of musketry, and throwing out a cluster of balls of fire which drifted off to leeward and were visible for at least five seconds; on examination of the funnel it was found that both steam pipes and steam whistle were covered with sulphur. From 21 h., on May 5, to 3 h. on May 6th, weather gradually moderating and clearing; at 8 h. on the 6th barometer 29.27 (743.4), strong nw. gale, high sea."

The s. s. "Circassia," A. Campbell, commanding, in N. 42° 29′, W. 47° 25′, had lowest barometer, 29.07 (738.4), at 8 p. m., on the 6th, the gale commencing at n. by w., and veering to ne. and ene.

The s. s. "Germanic," C. W. Kennedy, commanding, had lowest barometer, 28.86 (733.0), at noon of the 6th; gale of force 9, beginning at ssw., and veering to wnw., and then backing to sw., s., se., e. ne., and n. by e.

The s. s. "Tyrian," F. Hassenstein, commanding, reported strong sw. winds during the forenoon, with vivid lightning in the sw.; at 4 p. m. wind backed to se., and then to ne., barometer, 29.03 (737.3); (position at noon N. 42° 18′, W. 47° 0′).

The s. s. "Samaria," F. Dutton, commanding, had moderate w. winds in the early morning, with rain at 8 a. m.; at noon, strong se. wind and heavy rain; 4 p. m., moderate gale and cloudy; 9 p. m., heavy rain and strong gale; lowest barometer, 29.1 (739.1), at 11 p. m., in N. 43° 00′, W. 46° 00′; after this, weather moderating, strong ne. winds.

Vessels to the westward of the centre had strong nw. gales; the s. s. "City of Chicago," F. Watkins, commanding, in N. 42° 30′, W. 53° 15′, reported barometer 29.26 (743.2); nw. gale, lasting from 1 a. m., of the 6th till 4 a. m., of the 7th, and the s. s. "Holland," Wm. Tyson, commanding, in N. 41° 15′, W. 48° 50′, had barometer, 29.1 (739.1), wind n. by w., force 9.

On the 7th, the storm-centre was near N. 40°, W. 46°, where the lowest pressure was 29.18 (741.2), observed on board the s. s. "Weser," H. Bruns, commanding, in N. 39° 59′, W. 46° 43′, winds from wnw. to nw. and w., moderate to strong gale.

During the 8th and 9th, the disturbance moved slowly eastward, with steadily increasing pressure and an abatement in the force of the winds, which had now moderated to strong breezes or moderate gales.

On the 10th, the depression was shown near N. 44°, W. 28°, the pressure having increased to 29.7 (754.4), and the ocean to the eastward was apparently occupied by an area of high pressure.

5.—This depression appeared off the coast of the Carolinas during the night of the 9th, and on the morning of the 10th its centre was near Cape Hatteras; the s. s. "Ivanhoe," J. Cameron, commanding, apparently crossed the track of the depression and reported moderate w. winds and heavy rain at 7 p. m. of the 9th, backing to strong sw. gale and continuing until 2 a. m. of the 10th, when it suddenly changed to nne. and continued until 2 p. m. after which it lulled; the lowest barometer reading was 29.7 (754.4) at 4 a. m. of the 10th, in N. 34° 22′, W. 74° 18′. The barkentine "Bonny Doon," J. S. Cole, commanding, in N. 37° 11′, W. 74° 24′, at 7 a. m. of the 10th, had barometer 29.66 (753.4), wind nne. force 6, cloudy. The pressure increased as the disturbance moved northeastward, and by the 11th, it was shown near N. 39°, W. 63°, where the pressure was 29.85 (758.2); the chart for the following day indicated that the depression had filled in.

6.—This was a slight depression which appeared off the southwest coast of Ireland on the 13th, and apparently moved southeastward over the Bay of Biscay during the day; the lowest reported pressure on the 13th was 29.7 (754.4), and moderate nnw. to ne. gales occurred between W. 10° and 15°.

7.—This depression apparently approached the British coasts from the northwest on the 20th. The s. s. "Zaandam," E. M. Chevalier, commanding, in N. 49° 31′, W. 16° 51′, at 11 a. m. of the 20th, had barometer 29.49 (749.0), strong gale from w. to wnw.; the s. s. "Australia," A. McRitchie, commanding, in about N. 48° 54′, W. 12° 8′, reported at 4 a. m. on

the 20th barometer 29.6 (751.8); 8 a. m., 29.54 (750.3), strong breeze with heavy squalls of rain and hail; noon, barometer 29.48 (748.8), moderate to fresh wnw. gale with hard squalls of hail and sleet; 4 p. m., 29.32 (744.7), weather same, wind w. by s.; 7 p. m., 29.26 (743.2), breeze moderating; 10 p. m., 29.32 (744.7), strong breeze with passing showers; midnight, moderate breeze and clear weather, barometer 29.34 (745.2). The s. s. "Weser," H. Bruns, commanding, had lowest barometer, 29.32 (744.7) at midnight of the 20th in N. 50° 4′, W. 5° 12′, moderate gale from sw. to w. by s. During the 20th the depression entered Ireland, and by the 21st it occupied the British Isles and the North Sea.

8.—This was probably a continuation of the depression described as low area v. under "Areas of low barometer." It passed over the Maritime Provinces during the afternoon of the 19th, and on the 20th it was shown as a shallow depression over Newfoundland, with pressure about 29.8 (756.9). It moved slowly eastward, with nearly stationary pressure, but attended by moderate n. and nw. gales in its rear, until the 25th, when it appeared off the west coast of Ireland, the pressure near the centre being about 29.55 (750.6).

9.—This depression, which displayed much energy during its progress, first appeared on the 25th in the region north of 50° N., and west of 30° W. At midnight of that date the s. s. "Celtic," B. Gleadell, commanding, in N. 48° 22′, W. 36° 7′, had barometer down to 29.5 (749.3), fresh gale from w., veering to nw. and nnw.

On the 26th the storm-centre was clearly defined near N. 49°, W. 27°, the pressure having decreased to 29.0 (736.6), while strong gales were blowing in all quadrants of the depression. The following reports show the violence of the storm.

The s. s. "Spain," W. A. Griffiths, commanding, reported: May 26th, at 13 hrs. 25 m. (Greenwich mean time), in N. 50° 00′, W. 23° 11′, barometer 29.44 (747.8), wind se., force 5; 20 hrs., barometer 29.12 (739.6), wind sw., force 6; 22 hrs., barometer 29.02 (737.1), wind se., force 6, light rain. On the 27th, at 2 hrs., the barometer read 28.91 (734.3), wind n., force 7, light rain; 3 hrs. 35 m., barometer 28.83 (732.3), wind nne., force 8, light rain; 4 hrs., barometer rising slowly and weather clearing; at 13 hrs. 45 m., in N. 48° 50′, W. 30° 59′, barometer 29.21 (741.9), wind n.

The s. s. "Wyoming," C. L. Rigby, commanding, reported: 26th, 8 a. m. (ship's time), in N. 50° 28′, W. 21° 36′, barometer 29.67 (753.6), light sw. breeze, cloudy weather, long sw. sea-swell, barometer falling rapidly; noon, in N. 50° 17′, W. 22° 56′, barometer 29.45 (748.0), strong breeze with threatening appearance; 4 p. m., in N. 50° 04′, W. 24° 05′, barometer 29.18 (741.2), strong breeze, squally weather and very heavy rain, wind veering from se. to n. around by w.; 8 p. m., in N. 49° 50′, W. 25° 14′, barometer 29.0 (736.6), strong variable winds with heavy squalls of rain, wind veering around the compass; 10 p. m., N. 49° 44′, W. 25° 42′, barometer 28.95 (735.3), wind n. by e., strong breeze with heavy squalls of rain and wind; midnight, in N. 49° 38′, W. 26° 18′, barometer 29.01 (736.8) wind nnw., increasing breeze with heavy gusts. On the 27th, at 4 a. m., in N. 49° 24′, W. 27° 28′, the barometer read 29.14 (740.1), wind nnw., fresh gale; noon, in N. 48° 53′, W. 29° 48′, barometer 29.55 (750.6), gale moderating, barometer rising rapidly.

The s. s. "Etruria," J. Cook, commanding, had a nw. gale at 4 p. m. of the 26th, continuing until 4 a. m. of the 27th and ending at n.; the greatest force of the wind was estimated at 10, and occurred between 8 p. m. and midnight of the 26th; lowest barometer 29.10 (739.1), at 4 p. m. on the 26th, in N. 48° 30′, W. 29° 30′. S. S. "Llandaff City," T. L. Weiss, commanding, in N. 48° 56′, W. 32° 10′, barometer 29.12 (739.6), wind wnw., force 8, cloudy; the s. s. "Circassia," A. Campbell, commanding, took a gale from nw. at 6 a. m. of the 26th, lasting until 6.30 p. m.; the lowest barometer was 29.12 (739.6) at 4 a. m., in N. 51° 30′, W. 34° 30′.

On the 27th the storm centre remained between W. 20° and 25° and near N. 50°; the strong gales continuing over the ocean as far westward as the thirtieth meridian. The s. s. "Jan Breydel," H. Meyer, commanding, reported barometer 29.02 (737.1) at 2 a. m. of the 27th, in N. 48° 43′, W. 29° 57′, whole gale from w. to nnw.; the s. s. "Saint Laurent," M. de Jousselin, commanding, in N. 48° 56′, W. 26° 50′, at 6 a. m. of the 27th, barometer 29.02 (737.1) wind nw., force 8. The s. s. "Assyrian Monarch," J. Harrison, commanding, in N. 49° 1′, W. 19° 25′, at noon of the 27th had lowest barometer 29.0 (736.6), strong gale from sw. to w. and nw.; and the s. s. "Rhynland," J. C. Jamison, commanding, reported at 17 hrs. of the 27th, in N. 48° 48′, W. 21° 23′, barometer 29.11 (739.4), heavy gale from ssw. to wsw., w., and nnw., with heavy squalls of hail and rain and very heavy sea.

On the 28th the disturbance appeared to be moving to the northward and beyond the range of the observations, while the w. and sw. gales continued near the fiftieth parallel.

10.—This depression appeared to the northeastward of the Banks on the 28th; it apparently moved slowly northeastward with its centre to the northward of the fiftieth parallel. The lowest pressures reported during its progress ranged from 29.7 (754.4) to 29.8 (756.9), and the wind did not exceed the force of a strong gale.

OCEAN ICE.

On chart i. are also shown the eastern and southern limits of the north Atlantic ice-region for May, 1885. These limits are determined from reports furnished by shipmasters, and from trustworthy data published in the "New York Maritime Register" and other newspapers.

During this month the line indicating the eastern limit of the ice-region, so far as shown by the reports at hand, extends from about 50° N., 46° W., in a s. 35° e. direction, to 42° 30′ N., 40° 10′ W. (the easternmost iceberg); from that point the southern limit extends west-southwestward to 40° 50′ N., 48° 15′ W. (the southernmost icebergs), and thence west-northwestward to 41° 30′ N., 53° 0′ W., and from the last-mentioned position northwestward to the entrance to the Gulf of Saint Lawrence; the region most thickly studded with icebergs and field-ice being between 48° and 42° N. and from 48° to 51° W.

May, 1885, has been remarkable for the unusually large number of icebergs and field-ice reported, and for the large area of water covered by those dangers to navigation. The number of icebergs and ice-fields in May, 1885, far exceeded the numbers observed in the same month of 1883 and 1884, and has equalled, if not exceeded, the quantity observed in May, 1882. In the last-mentioned month, however, the icebergs were reported nearer the coasts, and extended along the coast of Nova Scotia, the ports from Cape Breton Island to and including Halifax, being blocked with ice at the close of the month, while in May, 1885, the principal masses of ice occupied the eastern and southern edges of the Grand Banks. In May of both 1882 and 1885 much ice was observed in the Gulf of Saint Lawrence, navigation being greatly impeded.

As compared with the preceding month (April, 1885) the eastern limit for May is about one degree to the westward of that for April, but there has been a southerly movement, the southern limit being about one degree south of that for the preceding month.

The following table shows the comparison between May, 1885, and the same month of the three preceding years:

Southern limit.			Eastern limit.		
Date.	Lat. N.	Lon. W.	Date.	Lat. N.	Lon. W.
	° ′	° ′		° ′	° ′
May, 1882	40 46	47 35	May, 1882	42 40	40 00
May, 1883	40 30	47 00	May, 1883	45 40	45 12
May, 1884	41 30	47 30	May, 1884	43 30	44 50
May, 1885	40 50	48 15	May, 1885	42 30	40 10

Icebergs and field-ice were reported during May, 1885, as follows:

May 1st.—S. S. "Grecian Monarch," at 2 a. m., passed an iceberg in N. 42° 46′, W. 42° 46′; bark "Moen" collided with an iceberg in N. 46°, W. 45°, and foundered; s. s. "Geiser," in N. 44° 30′, W. 42° 9′, passed a medium-sized iceberg.

2d.—S. S. "Grecian Monarch," at 5 p. m., in N. 42° 43′, W. 49° 40′, passed an iceberg; s. s. "Arracan," at 2. a. m., in N. 45° 18′, W. 48° 00′, entered heavy floes of drift ice; at daylight sighted icebergs and was obliged to steer due south all day to clear them; counted more than one hundred large bergs.

4th.—S. S. "City of Chicago," in N. 45° 9′, W. 41° 54′, passed a large iceberg.

5th.—S. S. "Cilurnum" stove bow plates by collision with an iceberg in N. 45°, W. 47°.

6th.—S. S. "Furnessia," in N. 46° 52′, W. 42° 54′, passed an iceberg; also passed two bergs in N. 46° 20′, W. 43° 48′; s. s. "Clintonia," in N. 43° 19′, W. 47° 55′, passed four large icebergs; s. s. "Prussian," in N. 44° 46′, W. 44° 8′, at 11.30 a. m. passed a large iceberg four miles to the southward; bark "Bayard" was abandoned after collision with an iceberg in N. 46°, W. 48°; bark "Magdalena," in N. 45°, W. 47° collided with an iceberg and was abandoned; s. s. "Circassian," from N. 47° 20′, W. 42° 48′ to N. 46° 38′, W. 45° 21′, passed three icebergs. Captain Lord, commanding the s. s. "Critic," reported: "on the 6th, at 6 a. m., in N. 48° 0′, W. 47° 10′, encountered a solid wall of ice extending as far as the eye could reach in a wnw. and sse. direction; steered southward and encountered numerous icebergs from two hundred to eight hundred feet high, and assuming the dimensions of large islands; got clear of ice in N. 44° 0′, W. 49° 20′. In one hour's steaming at the rate of ten knots, we passed eighty-five icebergs; it was sixty hours from the time of sighting the ice until we got clear of it; the number of bergs must have gone into the thousands."

7th.—S. S. "Furnessia," in N. 43° 20′, W. 48° 40′, passed three icebergs; in N. 42° 50′, W. 50° 0′, passed another; s. s. "Servia," in N. 43° 34′, W. 48° 45′, passed ten icebergs; brig "Anne Christine," struck an iceberg and foundered on the Grand Banks. The s. s. "Circassian," in N. 45° 30′, W. 47° 50′, passed several large icebergs and much field-ice; got clear of field-ice and bergs in N. 43° 50′, W. 48° 46′.

8th.—S. S. "Nevada," in N. 45° 28′, W. 43° 20′, passed an iceberg; s. s. "Dorset," in N. 42° 15′, W. 50° 19′, passed a large iceberg, also a small one; s. s. "Moravia," in N. 41° 40′, W. 50° 16′, at 4 p. m. passed two large pieces of ice; temperature of water, 34°; air 40°.

9th.—S. S. "Nevada," in N. 43° 0′, W. 49° 34′, passed several large and small icebergs; s. s. "St. Ronans," in N. 43° 20′, W. 48° 10′, passed an iceberg about one hundred and fifty feet high and several small bergs and pieces of ice close to the ship; temperature of water 32°; air, 34°. The bark "Oscar," in N. 43° 5′, W. 45° 50′, passed several large icebergs; s. s. "Wyoming," between N. 42° 44′, W. 49° 50′, and N. 43° 15′, W. 48° 35′, passed several large and small icebergs and many pieces of ice; s. s. "Circassian," encountered field-ice in N. 47° 50′, W. 60° 54′; cleared field-ice on the 10th in N. 48° 26′, W. 62° 17′; s. s. "Ontario," in N. 47° 22′, W. 47° 55′, passed through heavy field-ice and saw many bergs.

10th.—S. S. "Ontario," in N. 45° 50′, W. 50° 6′, passed through field-ice and saw large icebergs; s. s. "Mary Louisa," fell in with heavy ice, crushing her plates and causing vessel to founder in N. 49°, W. 46°.

The New York "Journal of Commerce" contained the following:

QUEBEC, May 10.—There are about two dozen steamers now due here, one, two, and even three steamers of some of the lines being behind time. Such an occurrence has hitherto been unknown in the history of this port. From all accounts, the ice in the Gulf is unusually heavy, and blocks the usual Gulf route to this port.

HALIFAX, May 11.—Advices from Saint John's, N. F., state that Captain Fairweather, of the sealing steamer "Terra Nova," reports the prevalence of an unusual number of icebergs drifting southward in the track of Atlantic steamers when crossing the Banks, and for two hundred miles east of them.

NORTH SYDNEY, C. B., May 13.—Steamer "Jeranos," from Rotterdam, for Montreal, has put into this port in distress, having been in collision with an iceberg on the night of the 9th, knocking a hole in her bow. She passed numerous icebergs and field-ice between N. 47°, W. 46°, and N. 45°, W. 50°.

The "New York Herald" of May 10th published the following:

SAINT JOHN'S, N. F., May 9, 1885.—The mail steamer "Caspian," from Liverpool to Baltimore, arrived here this morning. Captain Barrett reports being forced to go down to the forty-fourth parallel to escape a vast belt of ice, two hundred and fifty miles wide, east and west, extending southward to the tail of the Grand Banks. Icebergs as low down as the forty-fourth parallel are simply innumerable, and are to be counted by hundreds.

11th.—S. S. "Venetian," between N. 43° 20′, W. 50° 2′, and N. 43° 35′, W. 49° 20′, from 11.45 a. m. to 2.45 p. m., passed sixty icebergs; Captain Trant reports: "eight of them were of large size, from one hundred to two hundred and thirty feet high, and from one-fourth to one-third of a mile long; a quantity were of moderate proportions, fifty to eighty feet high; remainder of various sizes, from ten to forty feet high. Except five, they were all south of us, from two miles to as far as the eye could reach, some in clusters together; apparently all clear to the northward, except the five above-mentioned, which were from three to five miles off; numerous small pieces were in their vicinity." The s. s. "Hammonia," in N. 42°, W. 50°, passed several large icebergs and some floating ice; also passed a large berg in N. 42° 9′, W. 49° 37′.

12th.—The bark "Privateer" saw one large and five small icebergs in N. 45° 30′, W. 45° 35′; s. s. "Rhein," in N. 43° 42′, W. 49° 53′, passed several large and small icebergs; s. s. "City of Richmond," in N. 42° 10′, W. 50° 30′ to 51° 30′, passed numerous icebergs to the north and south; temperature of the water, 32°. The s. s. "Scythia," in N. 43° 52′, W. 48° 48′, at 10 a. m., passed a large iceberg; in N. 43° 28′, W. 48° 30, passed another; from N. 43° 28′, W. 49° 34′ to W. 49° 53′ passed through a chain of icebergs too numerous to count and extending north and south as far as the eye could reach, the greater part being to the southward; in N. 43° 24′, W. 50° 41′, passed four bergs of moderate size about five miles to the northward. The s. s. "Ontario" passed several patches of field-ice from Saint Paul island to Anticosti; after this no more field-ice was seen in the Gulf of Saint Lawrence; Captain Couch also reports: "from the 9th to the 12th had a continuation of dense fogs; passing numerous patches of field-ice, which compelled me to run to the southward from N. 48° 30′, W. 46° 00′, to N. 45° 00′, and to stop for three nights." The s. s. "Venetian" in N. 45° 25′, W. 45° 20′, at 9 a. m., passed an iceberg about one hundred and fifty feet high.

13th.—S. S. "Adriatic," from N. 44° 09′, W. 49° 16′, to N. 43° 46′, W. 50° 36′, passed several icebergs; s. s. "Ems," in N. 41° 55′, W. 51° 06′, at 2.40 a. m., passed a large iceberg and another of medium size in N. 41° 55′, W. 51° 16′; s. s. "Indiana," in N. 40° 54′, W. 48° 24′, passed a large iceberg; s. s. "Australia," in N. 40° 50′, 48° 15′, passed a large iceberg.

14th.—The bark "Privateer" was surrounded by icebergs in N. 43° 30′, W. 50° 00′; counted twenty-three, some not more than a half mile distant; also passed many bergs during the night; saw no ice to the westward of longitude 52°. The s. s. "Elysia," in N. 43° 55′, W. 49° 35′, at 5.35 a. m., passed a large iceberg, also in N. 43° 46′, W. 50° 29′, passed two small bergs.

15th.—S. S. "Frisia," in N. 41° 24′, W. 51° 10′, at 7 a. m., passed several large icebergs; s. s. "Habsburg," in N. 41° 32′, W. 51° 07′, passed a large iceberg; in N. 41° 32′, W. 51° 22′, passed another. The s. s. "Gallia," between N. 43° 14′, W. 49° 40′, and N. 43° 0′, W. 49° 57′, passed through a group of icebergs, many of them being very large, also passed a very large berg in N. 42° 50′, W. 50° 41′. Captain Murphy reports: "The temperature of the water fell to 32° Fahr., when abreast of the ice at a distance of about two miles; as the vessel moved away from the ice the temperature increased steadily, having risen in the evening, six hours after the lowest observed temperature, to 58° Fahr."

16th.—S. S. "Iowa," in N. 41° 41′, W. 50° 54′, at 11.35 a. m., passed six large icebergs, one being about one hundred and

fifty feet high and a quarter of a mile long; at 12.30 p. m., in N. 41° 41′, W. 51° 9′, passed a large berg.

17th.—S. S. "State of Indiana," in N. 42° 24′, W. 50° 48′, passed seven large icebergs and several small pieces; s. s. "P. Caland," in N. 41° 32′, W. 48° 56′, at 4 p. m., passed an iceberg; the lowest temperature of the water was 38°.5, air 51°.8, when about six miles to leeward of the iceberg. The bark "Betty," in N. 43° 35′, W. 49° 26′, passed several large icebergs.

18th.—S. S. "Neckar," in N. 40° 59′, W. 48° 10′, at 3.45 p. m., passed a medium-sized iceberg.

19th.—S. S. "City of Berlin," in N. 43° 30′, W. 49° 30′, at 3.35 a. m., struck an iceberg, carrying away bowsprit and headwork; saw two others near same position. The s. s. "Gellert," in N. 41° 7′, W. 50° 12′, saw two icebergs about fifty feet high and one thousand feet long.

20th.—S. S. "Britannic," in N. 44° 58′, W. 49° 8′, at 11 a. m., passed an iceberg.

21st.—S. S. "Normandie," in N. 42° 42′, W. 47° 51′, at 3.50 p. m. passed an iceberg; in N. 42° 13′, W. 48° 47′, at 6.45 p. m. passed another; in N. 42° 13′, W. 50° 17′, at 11.30 p. m. passed three bergs. S. S. "Hanoverian," between N. 48° 44′, W. 45° 46′, and N. 47° 19′, W. 49° 5′, sighted several icebergs, also several off Cape Pine; last berg was seen about fifteen miles west of Cape Pine; water 37°, air 43°. S. S. "Château Léoville," in N. 41° 30′, W. 53° 0′, from 9 a. m. to noon, passed three icebergs; s. s. "Austrian," in N. 43° 26′, W. 48° 42′, passed a large iceberg and two small ones; the temperature indicated the presence of others which could not be seen owing to fog.

22d.—S. S. "Aurania," in N. 42° 50′, W. 50° 0′, passed an iceberg.

23d.—S. S. "Wisconsin," between N. 43° 0′, W. 48° 50′, and N. 42° 44′, W. 50° 40′, passed fifty icebergs of large size and also many detached pieces; s. s. "Anchoria," in N. 42° 38′, W. 50° 13′, saw seven large icebergs and numerous small pieces; s. s. "Iberian," in N. 43° 29′, W. 48° 34′, at 6.45 p. m. passed a large iceberg, at 8 p. m. passed seventeen large bergs.

24th.—S. S. "Kansas," in N. 42° 20′, W. 49° 50′ to 50° 30′, passed twenty-one large icebergs.

25th.—S. S. "Baltic," in N. 44° 9′, W. 44° 30′, passed an iceberg; s. s. "City of Rome," between N. 45° 0′, W. 48° 20′, and N. 44° 45′, W. 49° 2′, from 10.15 a. m. to 12.20 p. m., passed fifty-nine icebergs, ranging in height from thirty to eighty feet, besides numerous small pieces from three to five feet above water; s. s. "Zaandam," in N. 44° 9′, W. 48° 35′, passed an iceberg about three hundred feet high and half a mile long.

26th.—S. S. "Baltic," between N. 42° 30′, W. 50° 0′ and N. 42° 24′, W. 51° 35′, passed forty icebergs and numerous small pieces; s. s. "Boston City," in N. 44° 0′, W. 43° 10′, at 9.35 p. m., passed a large iceberg; soon after passed about twenty bergs; at 10 p. m., passed through fields of icebergs too numerous to count and continuing nearly all night; s. s. "Zaandam," between N. 42° 22′, W. 48° 56′ and N. 41° 44′, W. 51° 00′, passed twenty-six icebergs of large size; ship "E. B. Sutton," in N. 44° 20′, W. 43° 7′, passed a large iceberg.

27th.—S. S. "Celtic," in N. 44° 19′, W. 47° 44′, at 7.30 p. m., passed an iceberg; s. s. "Pavonia," between N. 42° 30′, W. 49° 25′ and N. 42° 30′, W. 51° 20′, from 6.30 a. m. to 12.40 p. m., passed through a group of large icebergs (about thirty), and many detached pieces; icebergs were visible about eight miles on both sides of the ship's course. The s. s. "State of Alabama," between N. 42° 50′, W. 48° 43′ and N. 42° 9′, W. 51° 26′, passed thirty-five icebergs; s. s. "Circassia," between N. 47° 47′, W. 45° 54′, and N. 46° 46′, W. 48° 0′, from noon of the 27th till noon of 28th passed numerous icebergs; s. s. "Lord Gough," between N. 43° 9′, W. 48 32′ and N. 42° 44′, W. 50° 21′, passed several icebergs, some of them of large size; s. s. "Boston City," in N. 44° 0′, W. 47° 0′, at 1.30 a. m., passed a very large iceberg.

28th.—S. S. "Lord O'Neill," in N. 42° 0′, W. 48° 0′, passed one large and several small icebergs; s. s. "Marengo," in N. 42° 40′, W. 50° 0′, passed several icebergs; s. s. "Grecian," in N. 46° 0′, W. 45° 0′ to 49° 0′, passed several icebergs and much small ice; s. s. "Elbe," between N. 42° 31′, W. 49° 55′ and N. 42° 30′, W. 50° 7′, passed two icebergs and several small pieces.

29th.—S. S. "Polynesian," in N. 41° 15′, W. 47° 45′, from 8 a. m. till noon passed five icebergs; ship "E. B. Sutton," in N. 42° 55′, W. 46° 50′, passed a large iceberg, also one in N. 42° 50′, W. 47° 25′.

30th.—S. S. "Bohemia," in N. 42° 42′, W. 40° 10′, passed an iceberg from fifty to sixty feet high and two hundred feet long; s. s. "Llandaff City," between N. 43° 40′, W. 48° 13′, and N. 43° 25′, W. 49° 53′, sighted thirty icebergs; s. s. "St. Laurent," between N. 43° 35′, W. 48° 25′, and N. 43° 23′, W. 51° 0′ passed twenty-three icebergs and an ice field; s. s. "Wyoming," between N. 43° 39′, W. 48° 25′, and N. 43° 23′, W. 50° 9′, passed twenty-one large and small icebergs from 7.40 a. m. till 12.35 p. m.; at 3.45 p. m. in N. 43° 19′, W. 51° 5′, passed another large berg. The s. s. "Spain," in N. 43° 14′, W. 45° 47′, passed a small iceberg; in N. 43° 17′, W. 45° 52′, passed a very large berg; s. s. "State of Nevada," in N. 41° 24′, W. 47° 52′, passed an iceberg; s. s. "Jan Breydel" between N. 43° 7′, W. 48° 32′, and N. 42° 40′, W. 51° 3′, from 6 a. m. till 5 p. m, passed eighty-six large and several small icebergs; s. s. "Phœnician," between N. 43° 35′, W. 48° 40′, and N. 42° 40′, W. 51° 15′, from 3 a. m. to 3.30 p. m. passed through a field of icebergs; ice on both sides of the ship as far as the eye could reach; s. s. "Crystal," between N. 46° 30′, W. 46° 0′, and N. 45° 0′, W. 49° 0′, from 6 p. m. till 8 a. m., 31st, passed about sixty icebergs ranging from thirty to one hundred and twenty feet high; also many detached pieces. S. S. "Eider," in N. 40° 41′, W. 48° 6′, at 11.37 a. m. passed a medium-sized iceberg; also in N. 40° 44′, W. 47° 48′, at 0.45 p. m. passed another of moderate size; temperature of water, 57°.2.

31st.—S. S. "Tower Hill," between N. 43° 0′, W. 49° 0′, and N. 42° 30′, W. 51° 0′, passed from forty to fifty icebergs; ship "E. B. Sutton," between N. 42° 0′, W. 49° 0′ and N. 42° 16′, W. 51° 30′, passed a large number of icebergs, some very large: temperature of water 40° to 48°, air 44° to 52°; s. s. "Spain," between N. 41° 50′, W. 48° 40′ and N. 41° 20′, W. 50° 45′, passed thirty-one icebergs, ranging from forty to one hundred and fifty feet high, and from two hundred to two thousand feet long; s. s. "Palestine," in N. 44° 0′, W. 48° 0′ to 49° 20′, passed several icebergs; s. s. "Wetherby," in N. 41° 36′, W. 47° 15′, at 5.50 p. m., passed several icebergs; at 11 p. m., in N. 41° 27′, W. 48° 25′, passed several; s. s. "Rhynland," in N. 41° 0′, W. 47° 10′, at 3.19 p. m., passed a large iceberg about twelve miles to the northward; at 7.30 p. m., in N. 40° 50′, W. 48° 10′, passed three small icebergs about eight miles to the northward; s. s. "Bohemia," in N. 41° 17′, W. 46° 16′, passed an iceberg from sixty to seventy feet high and two hundred feet long; also passed two others.

The following additional data are taken from the "Ice Reports," of the "International Nautical Magazine:"

4th.—S. S. "Colina," in N. 49° 57′, W. 46° 20′, passed two large icebergs to the nw., and in N. 49° 27′, W. 48° 17′, at 10 p. m., fell in with heavy field-ice, and had to retrace course to the eastward to get clear water.

5th.—S. S. "Colina," in N. 48° 51′, W. 48° 18′, at noon, heavy field-ice and bergs to the westward; steaming southward along the edge of the ice.

6th.—S. S. "Colina," in N. 48° 26′, W. 46° 52′, heavy field-ice and bergs to the westward, steaming to the se.; s. s. "Salier," in N. 47° 52′, W. 45° 30′, at 4 p. m., passed several detached bergs, but soon afterward encountered more, the number increasing rapidly so that they became uncountable. They were of all sizes, up to one hundred and fifty feet, and were interspersed with heavy ice-fields. Had to retrace our course to the eastward several times to get into

clear water. Skirted the ice for two days. Position at noon of May 7, N. 45° 30′, W. 48° 01′; at 8 p. m. on the same day in N. 45° 0′, W. 48° 30′, were obliged to stop the engines for eight hours, being beset by the ice. Got clear of it finally on the 8th in N. 44° 0′, W. 49° 20′.

7th.—S. S. "Colina,', in N. 45° 40′, W. 47° 44′, at noon, in clear water; 1.30 p. m., weather foggy, steamed into straggling ice and bergs of various sizes; 2 p. m., dense fog and ice becoming heavy; had again to steer to the se., to get clear water.

8th.—Bark "Maggie L. Carvill," in N. 43° 50′, W. 48° 40′, saw large quantities of medium-sized icebergs and countless small pieces of ice, weather foggy; steered southward for one hundred miles to clear ice; bark "Linden" in N. 45° 00′, W. 49° 00′, at 10 a. m., encountered field-ice and bergs and continued to pass them until May 9th, in N. 43° 00′, W. 51° 00′. Had to steer sse. about ten miles to clear a sheet of field-ice; s. s. "Colina," in 44° 10′, W. 50° 49′, passed through a quantity of floe ice; s. s. "Jersey City," from N. 43° 37′, W. 49° 54′, at 5 a. m, to N. 43° 25′, W. 50° 37′, at 8 a. m., passed innumerable small pieces of ice.

9th.—Bark "Hassel," in N. 46° 50′, W. 45° 10′, at 2 p. m., passed an iceberg about thirty feet high; sailed in thick fog until May 10th, in N. 45° 45′, W. 47° 20′, when we saw thirty bergs, ranging from twenty to one hundred feet high. On May 11th, in N. 44° 29′, W. 50° 18′, weather clear, passed more than two hundred large icebergs and much small ice, reached clear water in N. 44° 19′, W. 51° 00′; bark "Brilliant," in N. 45° 50′, W. 48° 46′, sighted numerous icebergs and ran into field-ice and remained fast for six hours, afterward sailed nw. by n. for one hundred and twenty miles along field-ice, and at 4 a. m. on the 11th, in N. 46° 05′, W. 50° 25′, got clear of ice; s. s. "Titania," at 1.30 a. m., ran into a field of ice and stopped for daylight, 4 a. m., began to force a passage through the ice; 7 a. m., ice becoming thicker, forced a passage through heavy field-ice until 4 p. m., dense fog all the time; at 10.30 p. m., had to stop engines until 2 a. m. the next morning. Ship's position at noon N. 48° 28′, W. 49° 37′.

10th.—The s. s. "Colina" encountered large quantities of field and straggling ice in the Gulf of Saint Lawrence and remained fast for nine hours, after which we got clear and proceeded on our voyage; s. s. "Titania," at 10.30 a. m., off Cape Race, passed several detached bergs and continued to pass occasional icebergs, some of them very large, until midnight.

11th.—Bark "Speranza," in N. 41° 41′, W. 47° 40′, passed one large iceberg, and, in N. 41° 40′, W. 48° 10′, passed one large and one small berg; s. s. "Titania," in N. 47° 35′ W. 50° 37′, at noon; from 4 p. m. till midnight, passed through quantities of scattered field-ice.

12th.—Bark "Speranza," in N. 41° 38′, W. 49° 40′ passed a large iceberg.

13th.—Ship "Columbia," in N. 41° 39′, W. 51° 00′, at 8 a. m., passed an iceberg two hundred and fifty feet high; from this position to N. 41° 35′, W. 52° 50′, saw seven large icebergs, ranging from forty to one hundred and fifty feet high, and a number of small pieces. Temperature of the air varying from 60° to 50° when nearing the bergs; temperature of water falling from 50° to 30° when passing them. The s. s. "Suffolk," in N. 47° 0′, W. 46° 0′, had alternately foggy and clear weather; saw a great number of very large icebergs and some small ice. Our progress was greatly impeded up to May 15th when we sighted the last twelve bergs in N. 45° 20′, W. 50° 38′; approaching the Gulf of Saint Lawrence the weather cleared and we passed quantities of small ice to the northwest of Bird Rocks. Ship "Rence," in N. 42° 0′, W. 50° 0′, saw an iceberg three-quarters of a mile long and one hundred and fifty feet high.

14th.—Ship "Rence," in N. 41° 20′, W. 53° 00′, passed ten bergs of various sizes; thick fog prevailing.

17th.—S. S. "India," in N. 41° 44′, W. 48° 12′, at 4 p. m. saw a large iceberg about sixty feet high and about three hundred feet long; at the same time saw a small berg about four miles to the northward.

18th.—S. S. "Galileo," in N. 42° 49′, W. 47° 15′, passed a medium-sized iceberg

21st.—S. S. "Westphalia," in N. 41° 41′, W. 49° 58′, at 1.15 p. m. passed an iceberg about two hundred feet high and five hundred feet long.

23d.—S. S. "Surrey," in N. 43° 34′, W. 48° 44′, at 10.30 p. m. passed the first iceberg about one hundred feet high and two hundred feet long; passed innumerable bergs until 3.30 a. m. of the 24th, when several icebergs of various sizes were seen between N. 43° 16′, W. 50° 1′, and N. 43° 4′, W. 50° 46′.

24th.—S. S. "Werra," in N. 41° 30′, W. 48° 27′, at 4 a. m. saw two icebergs, each about one hundred feet high and three hundred feet long; in N. 41° 30′, W. 49° 25′, at 6 a. m. saw nine bergs of various sizes, and in N. 41° 42′, W. 50° 56′, at noon saw one large berg about two hundred feet high.

26th.—S. S. "Suevia," in N. 44° 12′, W. 43° 24′, at 1.05 p. m. passed a large berg about eighty feet high and one thousand feet long, and in N. 44° 8′, W. 43° 34′, passed a medium-sized berg.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York and Philadelphia and in the Custom-house at Boston, where the necessary blanks and other information will be furnished to shipmasters. In the January REVIEW was published an explanation of the object of these agencies.

In pursuance of the arrangements made with the meteorological office of London, England, there were, during May, 1885, sixteen reports cabled to that office from New York, concerning storms and icebergs encountered by vessels on the Atlantic west of the forty-fifth meridian. Three messages were sent from the agency at Boston.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada is exhibited on chart ii. by the dotted isothermal lines; and in the table of miscellaneous meteorological data are given the means for the various stations of the Signal Service.

In the following table are given the mean temperatures for the several geographical districts with the normals and departures, as deduced from the Signal Service observations:

Average temperatures for May, 1885.

Districts.	Average for May. Signal-Service observations.		Comparison of May, 1885, with the average for several years.
	For several years.	For 1885.	
	°	°	°
New England	54.9	53.1	— 1.8
Middle Atlantic states	61.5	59.3	— 2.2
South Atlantic states	70.0	69.1	— 0.9
Florida peninsula	76.7	75.8	— 0.9
Eastern Gulf states	72.6	70.2	— 2.4
Western Gulf states	73.3	71.2	— 2.1
Rio Grande valley	80.1	76.2	— 3.9
Tennessee	68.9	65.8	— 3.1
Ohio valley	65.0	62.6	— 2.4
Lower lake region	57.2	55.5	— 1.7
Upper lake region	51.3	48.5	— 2.8
Extreme northwest	52.4	51.7	— 0.7
Upper Mississippi valley	62.7	60.1	— 2.6
Missouri valley	59.2	58.1	— 1.1
Northern slope	52.4	52.1	— 0.3
Middle slope	59.6	56.8	— 2.8
Southern slope	70.8	66.4	— 4.4
Southern plateau	66.6	66.1	— 0.5
Middle plateau	55.2	55.8	+ 0.6
Northern plateau	56.8	58.4	+ 1.6
North Pacific coast region	55.0	57.6	+ 2.6
Middle Pacific coast region	59.2	61.2	+ 2.0
South Pacific coast region	66.6	68.3	+ 1.7
Mount Washington, N. H	33.5	36.1	+ 2.6
Pike's Peak, Colo	21.9	21.1	— 0.8

The mean temperature, as shown in the table of averages for the several districts, has been below the normal in every

district east of the Rocky mountains, and above the normal in the northern plateau and on the Pacific coast.

In the table of miscellaneous meteorological data are given the means and departures for the several stations, and on chart iv. the departures are exhibited by lines connecting stations of equal departure.

Although the temperature for the various districts east of the Rocky mountains has averaged below the normal, yet at a few stations, viz., in northern New England, along the south Atlantic coast, and at Pittsburg, Pennsylvania, it has been normal or slightly above.

On the summit of Mount Washington, New Hampshire, the mean temperature was 2°.6 above the May normal for the last thirteen years, and at Eastport, Maine, and Pittsburg, Pennsylvania, it was 0°.2 and 0°.3 above normals deduced from records covering twelve and fourteen years, respectively. At Hatteras and Wilmington, North Carolina, very slight departures above the normal are shown, and at Portland, Maine, Fort Macon, North Carolina, and Charleston, South Carolina, the mean temperatures coincide with their respective normals.

At Huron, Dakota, and West Las Animas, Colorado, the mean temperature, as shown in the table, was slightly above the normal, while the means at neighboring stations were decidedly below. This is due to the short records from which the normals are deduced at Huron and West Las Animas, as the observations at these stations cover a shorter period than those at the other stations.

The regions of greatest departure below the normal temperature comprise portions of Tennessee, Ohio and Illinois, and an area extending from the Rio Grande valley northward to western Nebraska and southeastern Wyoming.

In the northern plateau and on the Pacific coast the month has been warmer than the average May, the departures above the normal temperatures varying from 1° to 4°.

RANGES OF TEMPERATURE.

The monthly, and greatest and least daily ranges of temperature for the Signal Service stations will be found in the table of miscellaneous meteorological data. The monthly ranges were greatest in the upper lake region, upper Mississippi and Missouri valleys, and in the Rocky mountain districts; they were least at the stations on the Atlantic, Pacific, and Gulf coasts. The extreme monthly ranges are: least, 17°.5 at Tatoosh Island, Washington Territory; 20°.4 at Key West, Florida; 20°.9 at San Diego, California; 23°.8 at Cape Mendocino, California, and 24°.5 at Pensacola, Florida. The greatest are 78°.0 at Phœnix, Arizona; 68°.9, 67°.0 and 66°.9, respectively, at Forts Custer, Benton and Maginnis, Montana.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for the several geographical districts; in the table of miscellaneous meteorological data, and on chart iv. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: mean temperature, 67°.1, is 1°.4 above the May average for the three preceding years.

Dakota.—Webster, Day county: mean temperature, 57°.5, is 3° above the May average for the two preceding years.

Georgia.—Milledgeville,: mean temperature, 69°.9, is about the May normal.

Illinois.—Anna, Union county: mean temperature, 64°.2, is 2°.7 below the May average for the last ten years.

Mattoon, Coles county: mean temperature, 62°.0, is 4° below May average for the last five years.

Sycamore, DeKalb county: mean temperature, 54°.2, corresponds to the May normal.

Riley, McHenry county: mean temperature, 54°.4, is 2°.5 below the May average for the last twenty-four years: the mean temperature for the spring months of 1885 is 40°.5, or 3°.3 below the normal for the above period; only the spring of 1867 was colder.

Swanwick, Perry county: mean temperature, 63°.2 is 0°.1 below the May average for the last four years.

Collinsville, Madison county: mean temperature, 62°.2, is 4° below the May average.

Indiana.—Vevay, Switzerland county: mean temperature, 63°.8, is 1°.6 below the average for the last twenty-one years.

Logansport, Cass county: mean temperature, 61°.4, is 2°.6 below the May average for the last twenty-six years.

Wabash, Wabash county: mean temperature, 58°.7, is 0°.4 below the May average for the last nine years.

Spiceland, Henry county: mean temperature, 60°.1, is 1°.2 below the May average for the last thirty-one years.

Kansas.—Independence, Montgomery county: mean temperature, 63°.2, is 2°.8 below the May average for the last thirteen years.

Wellington, Sumner county: mean temperature, 64°.4, is 0°.2 above the May average for the last seven years.

Yates Centre, Woodson county: mean temperature, 62°.0, is 1°.4 below the May average for the last five years.

Topeka, Shawnee county: mean temperature, 61°.8, is slightly lower than the normal for May.

Emporia, Lyon county: mean temperature, 62°.1, is 0°.6 below the May normal.

Lawrence, Douglas county: mean temperature, 62°.8, is 2°.9 below the May normal for the last eighteen years.

Maine.—Gardiner, Kennebec county: mean temperature, 51°9, is 1°.5 below the May average for the last forty-seven years.

Maryland.—Fallston, Harford county: mean temperature, 59°.1, is 1°.8 below the May average for the last fourteen years.

Massachusetts.—Somerset, Bristol county: mean temperature, 56°.6, is 2°.3 below the May normal.

Worcester, Worcester county: May is the ninth consecutive month for which the mean temperature has been below the normal. In but two of the last forty-seven years has the mean temperature for May been lower than that (52°.4) for 1885, viz: in 1850 and 1882.

New Hampshire.—Contoocook, Merrimac county: mean temperature, 57°.5, is 1° below the May average for the last fourteen years.

New Jersey.—South Orange, Essex county: mean temperature, 57°.3, is the lowest recorded during the last fifteen years with two exceptions, viz: 1882 and 1884. The mean temperature for the spring season, 44°.7, is 2°.5 below the spring average and is the lowest for the above period.

Nevada.—Carson City: mean temperature, 58°.8, is 2°.1 above the May average.

New York.—Palermo, Oswego county: mean temperature, 53°.9, is 2°.4 below the May average for the last thirty-two years. The mean temperature for the spring season, 40°.3, is 4°.3 below the spring average for the same period.

North Volney, Oswego county: mean temperature, 54°.9, is 0°.2 below the May normal for the last eighteen years. The mean temperature for the spring season, 37°.6, is 3°.8 below the spring normal and is the lowest for the above period. The warmest spring occurred in 1878, the mean temperature being 47°.4

Ohio.—Wauseon, Fulton county: mean temperature, 56°.9, is 1°.9 below the May average for the last fifteen years. The mean temperature for the spring months (March, April and May) is 42°.2, or 3°.7 below the spring average for the above period.

Texas.—New Ulm, Austin county: mean temperature, 72°.0, is 2°.4 below the May average for the last thirteen years.

Vermont.—Woodstock, Windsor county: mean temperature, 54°.8, is 0°.7 above the May average for the last eighteen years.

Virginia.—Wytheville, Wythe county: mean temperature, 60°.5, is 0°.4 below the May normal for a period of twenty-two years.

Bird's Nest, Northampton county: mean temperature, 67°.0, is 2° above the May average for the last seventeen years.

Variety Mills, Nelson county: mean temperature, 62°.5, is 1°.3 below the May average for the last eight years.

Dale Enterprise, Rockingham county: mean temperature, 64°.6, is 0°.8 above the May average for the last five years,

West Virginia.—Helvetia, Randolph county: mean temperature, 56°.4, is 1°.8 below the May average for the last nine years.

Wisconsin.—Beloit, Rock county: mean temperature, 55°.6, is 2°.7 below the May average for the last thirty-six years.

FROSTS.

Frosts occurred in the several states and territories during May, 1885, on the following dates:

Arkansas.—Mount Ida, 10th; Lead Hill, 8th, 9th, 10th.

Colorado.—Denver, 6th, 7th, 8th, 11th; Pike's Peak, 2d, 3d, 4th, 7th, 8th, 9th, 20th, 27th; Montrose, 1st, 19th, 24th, 25th; Fort Lewis, 11th.

Connecticut.—New Haven, 4th, 5th, 10th, 12th; New London, 4th; Hartford, 4th, 12th.

Dakota.—Fort Totten, 9th, 16th, 17th; Fort Buford, 3d, 6th

Table of comparative maximum temperatures for the month of May.

State or Territory.	Maximum for May, 1885, Signal Service.		Maximum since Signal-Service stations were opened—3 to 14 years.			Highest from any other source.			
	Station.	Temperature.	Station.	Temperature.	Year.	Place.	Temperature.	Year.	Length of record.
		°		°			°		Years.
Alabama	Montgomery	88.8	Montgomery	98	1875	Mount Vernon Arsenal	102		34
Do	Mobile	80.4	Mobile	98	1878	Mobile	92		34
Arizona	Prescott	90 5	Prescott	90	1878	Fort Verde	111		12
Do	Yuma	110.0	Yuma	108.7	1883	Fort Mojave	110		11
Arkansas	Fort Smith	86.3	Fort Smith	93.3	1883	Fort Smith	93		21
Do	Little Rock	89.2	Little Rock	91	1880	Little Rock	87		28
California	San Francisco	77.0	San Francisco	86	1883	Benicia Barracks	95		25
Do	San Diego	73.4	San Diego	94	1879	San Diego	96		17
Colorado	Denver	80.0	Denver	92	1874	Fort Lyon	99	1880	23
Do	Pike's Peak	38.7	Pike's Peak	47	1880	Fort Garland	93		22
Connecticut	New Haven	82.2	New Haven	89	1880	New Haven	93		86
Do	New London	80.3	New London	89	1881	Fort Trumbull	92		48
Dakota	Fort Buford	84.1	Fort Buford	95	1880	Fort Abercrombie	102		19
Do	Yankton	85.6	Yankton	94	1880	Fort Randall	101		24
Delaware	Cape Henlopen	82.0	Delaware Breakwater	89	1880	Fort Delaware	91		45
District of Columbia	Washington City	80.4	Washington City	96	1880	Washington City	96		49
Florida	Pensacola	86.2	Pensacola	93	1881	Fort Barrancas	93		53
Do	Key West	90.8	Key West	93.2	1881	Key West	95		44
Georgia	Savannah	90.6	Savannah	98	1878	Savannah	97		37
Do	Augusta	91.9	Augusta	100	1878	Augusta Arsenal	96		49
Idaho	Lewiston	86.8	Lewiston	92	1884	Fort Lapwai	101		18
Do	Boisé City	86.8	Boisé City	88	1881	Fort Boise	95		11
Illinois	Chicago	80.4	Chicago	89	1874	Chicago	98		38
Do	Cairo	89.3	Cairo	92	1874	Mattoon	98	1876	2
Indiana	Indianapolis	87.7	Indianapolis	89	1881	Vevay	98		21
Indian Territory	Fort Sill	87.0	Fort Sill	97	1880	Fort Arbuckle	100		20
Do	Fort Reno	90.4	Fort Gibson	94	1874, 1880	Fort Gibson	99		47
Iowa	Dubuque	86.0	Dubuque	94	1874	Dubuque	91		11
Do	Des Moines	91.6	Des Moines	93	1880	Muscatine	90		27
Kansas	Leavenworth	88.0	Leavenworth	94	1874, 1875	Fort Leavenworth	94		44
Do	Dodge City	84.0	Dodge City	98	1879, 1880	Fort Riley	99		23
Kentucky	Louisville	87.4	Louisville	93	1881	Newport Barracks	90		29
Louisiana	Shreveport	92.0	Shreveport	101	1875	Baton Rouge	99		50
Do	New Orleans	87.0	New Orleans	92	1877	New Orleans	96		51
Maine	Portland	81.6	Portland	94	1880	Portland	93		37
Do	Eastport	72.6	Eastport	80	1877	Brunswick	98		38
Maryland	Baltimore	82.1	Baltimore	95	1881	Baltimore	90		37
Massachusetts	Boston	64.4	Boston	97	1880	Williamstown	95		60
Do			Springfield	94	1880	New Bedford	90		58
Michigan	Detroit	80.0	Detroit	90.5	1881	Detroit	94		38
Do	Alpena	78.3	Alpena	91	1874	Fort Brady	92		52
Minnesota	Saint Paul	87.1	Saint Paul	94	1874	Fort Snelling	92		55
Do	Moorhead	85.3	Moorhead	88	1881	Fort Ripley	101		16
Mississippi	Vicksburg		Vicksburg	95	1874, 1877	Vicksburg	95		4
Missouri	Saint Louis	91.0	Saint Louis	93	1874	Saint Louis	97	1878	40
Montana	Fort Benton	89.1	Fort Benton	93	1875	Fort Benton	94		5
Do	Fort Shaw	85.2	Fort Shaw	84	1881	Fort Shaw	98		13
Nebraska	North Platte	85.2	North Platte	94	1880	Fort McPherson	100	1879	12
Do	Omaha	80.5	Omaha	92	1880	Fort Calhoun	98		5
Nevada	Winnemucca	86.4	Winnemucca	86	1881, 1882	Camp Halleck	104		7
New Hampshire	Mount Washington	61.9	Mount Washington	62	1879, 1880	Auburn	90	1881	5
New Jersey	Sandy Hook	83.1	Sandy Hook	93	1880	New Lisbon	101	1880	1
Do	Cape May	76.8	Cape May	81	1874, 1880	New Brunswick	98	1880	5
New Mexico	Lava	92.0	La Mesilla	101	1879, 1881	Fort McRae	109		11
Do	Santa Fé	77.0	Santa Fé	89	1872	Santa Fé	92		25
New York	Albany	86.1	Albany	92	1880	Albany	93		55
Do	Rochester	85.3	Rochester	90	1879	Rochester	89		40
North Carolina	Wilmington	87.9	Wilmington	95	1878	Fort Macon	93		16
Do	Kitty Hawk	86.6	Kitty Hawk	93	1880	Fort Johnson	92		55
Ohio	Cincinnati	84.1	Cincinnati	94	1874, 1875	Cincinnati	96	1877, 1881	42
Do	Cleveland	80.6	Cleveland	92	1879	Marietta	94		53
Oregon	Portland	94.0	Portland	90	1884	Fort Dalles	96		15
Do	Roseburg	88.7	Roseburg	88.2	1884	Fort Hoskins	95		8
Pennsylvania	Philadelphia	84.3	Philadelphia	96	1880	Philadelphia	98	1880	120
Do	Pittsburg	87.1	Pittsburg	95	1881	Allegheny Arsenal	96		31
Rhode Island	Block Island	75.8	Newport	85.2	1881	Providence	91		35
South Carolina	Charleston	90.2	Charleston	94	1878	Charleston	94		105
Tennessee	Memphis	90.2	Memphis	90	1879	Humboldt	98		4
Do	Knoxville	85.2	Knoxville	94	1877	Ashwood	96	1879	3
Texas	Rio Grande City	98.0	Rio Grande City	112	1879	Fort Ringgold	123	1879	32
Do	Fort Stockton	99.0	Fort Stockton	104	1879	Fort Stockton	111		15
Utah	Salt Lake City	83.8	Salt Lake City	91	1870	Fort Douglas	91		16
Vermont			Burlington	91	1880	Charlotte	96	1878	7
Virginia	Lynchburg	85.5	Lynchburg	96	1881	Alexandria	96		12
Do	Norfolk	84.4	Norfolk	98	1880	Fortress Monroe	91		49
Washington Territory	Olympia	77.7	Olympia	87	1878, 1884	Fort Walla Walla	99		14
Do	Dayton	86.6	Dayton	90	1880	Fort Vancouver	98		19
West Virginia			Morgantown	91	1875	Weston	100	1877	2
Wisconsin	Milwaukee	80.4	Milwaukee	90	1874	Milwaukee	91		11
Do	La Crosse	85.7	La Crosse	96	1874	Embarras	98		14
Wyoming	Cheyenne	79.1	Cheyenne	88	1874	Fort Laramie	98		27

to 12th; Huron, 9th; Yankton, 2d, 7th to 10th, 12th; Deadwood, 6th to 9th, 11th; Webster, 2d, 6th to 10th, 26th, 27th, 30th.

Georgia.—Milledgeville: reported in valleys on the 11th.

Idaho.—Boisé City, 17th, 23d; Albion, 22d, 23d, 24th.

Illinois.—Chicago, 9th, 10th, 11th; Springfield, 10th; Cairo, 8th, 9th, 10th; Anna and Swanwick, 8th; Rockford, 1st, 2d, 4th, 7th, 9th, 10th, 11th; Mattoon and Charleston, 8th, 10th; Riley, 2d, 4th, 7th to 11th; Sycamore, 2d, 3d, 7th to 10th.

Indiana.—Indianapolis, 2d, 10th; Spiceland, 2d, 3d, 10th; Logansport and Wabash, 3d; Guilford, 3d, 8th, 10th; Sunman, 3d, 4th, 8th, 10th; Vevay, 7th to 11th; Greencastle, 8th; Jeffersonville, 10th, 11th.

Iowa.—Davenport, 1st, 6th to 10th; Monticello, 1st, 2d, 4th, 6th to 11th, 19th; West Union, 1st, 4th, 7th, 9th, 10th, 11th; Cedar Rapids, 1st to 4th, 7th, 9th, 10th, 11th; Muscatine, 1st, 7th, 8th, 9th; Maynard, 1st, 2d, 9th, 10th, 11th, 19th; Des Moines, 2d, 7th, 9th, 10th; Cresco, 2d, 4th, 6th, 8th to 11th, 19th; Oscaloosa, 6th to 11th; Dubuque and Manchester, 7th, 9th, 10th, 11th; Keokuk, 7th, 10th; Fort Madison, 7th; Ottumwa, 7th, 8th; Independence, 7th, 9th; Guttenberg, 8th.

Kansas.—Concordia and Westmoreland, 2d, 7th to 10th; Allison, 2d, 7th to 10th, 12th, 25th; Topeka, 7th; Clay Centre, 7th, 8th, 9th; Leavenworth, 7th to 10th; Manhattan, 8th, 9th, 10th; Wyandotte, 8th, 10th; Dodge City, 9th, 10th, 12th; Independence and Yates Centre, 9th, 10th; Emporia and Wellington, 10th; Maud, 10th, 12th.

Kentucky.—Frankfort, 11th.

Maine.—Gardiner, 1st to 6th, 11th, 12th; Cornish, 3d, 4th; Waterville, 5th; Bangor, 5th, 6th, 11th, 12th, 28th.

Maryland.—Fallston, 10th, 12th.

Massachusetts.—Princeton, 3d; Fall River, 3d, 4th, 27th; Rowe, 3d, 4th, 10th, 12th; Deerfield, 3d, 4th, 5th, 11th, 12th; Somerset, 4th, 11th, 12th; Taunton, 4th, 12th; Amherst, 10th, 11th, 12th; Worcester, 29th.

Michigan.—Escanaba, 1st to 13th, 18th, 19th, 20th, 28th; Grand Haven, 1st, 2d, 6th, 11th, 13th; Alpena, 1st, 3d, 10th to 13th; Thornville, 1st to 4th, 8th to 11th; Marquette, 2d, 6th, 19th, 28th; Port Huron, 2d, 3d; Mackinaw City, 2d, 11th, 12th; Manistique, 2d, 3d, 11th; Birmingham, 2d, 11th; Ann Arbor, 3d, 4th, 11th; Lansing, 10th; Northport and Moorestown, 11th, 12th, 13th; Hudson, 11th, 19th, 20th, 23d.

Minnesota.—Saint Vincent, 1st, 2d, 3d, 5th, 6th, 9th, 17th; Duluth, 2d, 5th, 10th, 11th; Moorhead, 2d, 3d, 5th, 9th, 10th, 11th, 17th; Northfield, 2d, 6th to 10th, 19th; Chester, 2d, 4th, 6th to 13th, 19th; Saint Paul, 9th, 10th.

Missouri.—Saint Louis, 8th; Lamar, 8th, 9th, 10th; Carthage and Springfield, 8th, 10th.

Montana.—Poplar River, 2d, 3d, 8th to 12th, 17th, 24th; Fort Maginnis, 6th, 7th, 8th, 10th; Fort Shaw, 6th, 7th, 9th to 12th; Fort Assinaboine, 6th, 7th, 10th; Helena, 11th, 21st.

Nebraska.—Fairbury, 2d; Omaha, 2d, 9th, 10th; Tecumseh, 2d, 6th, 7th, 8th; Madison, 2d, 7th to 10th, 12th; Genoa, 2d, 7th, 8th, 9th; Harvard, 4th, 5th, 10th; Fremont, 6th to 10th; Crete and De Soto, 7th to 10th; Stockham, 7th, 8th; Yutan, 7th, 9th, 10th; North Platte, 12th.

Nevada.—Carson City, 13th to 18th, 21st to 24th; Winnemucca, 14th, 15th, 17th, 18th, 22d, 23d.

New Hampshire.—Mount Washington, 2d, 8th to 12th; Antrim, 3d, 4th, 6th.

New Jersey.—Dover, 4th, 9th to 12th; Somerville, 9th to 12th; Readington, 9th, 10th, 12th; Sandy Hook and Salem, 12th.

New Mexico.—Santa Fé, 6th, 11th, 14th.

New York.—Palermo, 1st to 5th, 12th; Albany, 2d, 3d, 4th; Menand Station, (near Albany), 2d, 5th, 11th; Oswego, 2d, 3d, 12th, 28th; North Volney, 2d, 3d, 12th; Buffalo, 3d; Rochester, 3d, 11th, 12th; Plattsburg Barracks, 3d, 5th, 10th; Cooperstown and Mountainville, 3d, 4th, 5th, 9th, 12th; Humphrey, 3d, 11th, 15th; LeRoy and Ithaca, 12th; Auburn, 12th, 13th.

North Carolina.—Statesville, 11th; Blackwell, 11th, 16th.

Ohio.—Ruggles and Yellow Springs, 1st, 2d, 3d, 10th; Cleveland, 2d, 3d; North Lewisburg, 2d, 10th, 11th; Garrettsville, 2d, 3d, 11th; Jefferson, 3d; Toledo, 3d, 10th; Wauseon, 3d, 4th, 10th, 11th, 13th; Hiram, 3d, 7th; Tiffin, 3d, 11th; Portsmouth, 4th; Columbus, 8th; Cincinnati, 8th, 9th; Westerville, 11th, 14th.

Oregon.—Fort Klamath, 18th, 24th, 27th.

Pennsylvania.—Quakertown, 1st, 2d, 3d, 5th, 9th to 12th; Erie, 2d; Dyberry, 2d to 5th, 9th to 12th; Wellsboro, 2d to 5th, 9th, 10th, 12th; Wysox, 3d, 9th, 12th; Catawissa, 3d, 5th, 8th, 12th; Grampian Hills, 5th, 9th, 12th; Blooming Grove, 9th; Fallsington, 9th, 31st.

Rhode Island.—Point Judith, 3d, 4th, 5th, 11th, 12th; Narragansett Pier, 11th.

South Carolina.—Pacolet, 11th.

Tennessee.—Ashwood, 3d, 10th, 11th, 12th; Austin, 3d, 9th, 10th; Nashville, 8th, 10th; Memphis, 9th, 10th; Milan, 10th; Chattanooga, 11th.

Utah.—Nephi, 6th, 15th, 16th, 19th, 23d, 24th; Salt Lake City, 16th, 24th.

Vermont.—Newport, 1st to 4th, 9th; Woodstock, 3d, 4th, 10th, 28th, 29th.

Virginia.—Marion, 4th, 9th, 10th, 11th; Dale Enterprise, 8th to 11th; Variety Mills and Wytheville, 9th, 11th; Lynchburg and Snowville, 11th; Bird's Nest, 12th.

Washington Territory.—Dayton, 9th.

West Virginia.—Helvetia, 3d, 5th, 9th.

Wisconsin.—La Crosse, 1st, 2d, 4th, 7th to 11th, 19th; Neillsville, 1st to 4th, 6th to 12th, 19th, 20th; Embarras, 1st to 4th, 7th, 11th, 19th; Wausau, 1st to 11th, 18th, 19th; Beloit, 1st, 7th; Milwaukee and Sussex, 2d, 11th; Franklin, 11th.

Wyoming.—Cheyenne, 1st to 4th, 6th to 9th, 11th, 12th, 15th, 19th, 25th; Fort Bridger, 11th, 27th.

The following reports of injury to vegetation by frost have been received:

La Crosse, Wisconsin: the temperature fell to 29°.5 on the 7th, being the lowest with one exception, viz.: on May 2d, 1875, (29°), that has been recorded in May since the establishment of this station.

Janesville, Rock county, Wisconsin: the temperature fell to 28° on the 7th, and ice one-fourth inch in thickness formed. The tobacco plants were seriously injured.

Burlington, Iowa: on the morning of the 7th the temperature fell to 30°; small fruits were injured.

Des Moines, Iowa: the frost on the 7th caused injury to fruit and the growing crops.

Davenport, Iowa: the temperature fell to 29°.3 on the morning of the 7th; this is the lowest temperature recorded in May during the last thirteen years. Plants and fruits were injured.

Cairo, Illinois: early vegetables were damaged by the frosts on the 8th and 9th.

Huron, Dakota: the buds of trees and garden vegetables froze on the 8th and 9th; on the morning of the latter date the temperature fell to 25°.3.

Concordia, Kansas: nearly all of the early crops were blighted by the frosts on the 7th and 8th. The temperature fell to 31° on the latter date.

Lynchburg, Virginia: reports from southwestern Virginia state that there was a heavy frost on the morning of the 11th, which caused considerable damage.

Winnemucca, Nevada: on the morning of the 23d, ice formed to a thickness of one-fourth of an inch; potatoes and other vegetables were killed.

ICE.

Ice formed in the various states and territories during May, as follows:

Idaho.—Albion, 24th.

Illinois.—Riley, 7th; Sycamore, 26th.

Iowa.—Independence, Cedar Rapids, Dubuque, Davenport, and Des Moines, 7th; Oscaloosa, 6th to 10th; Cresco, 2d, 4th, 9th, 10th, 11th; Muscatine, 7th, 8th, 9th.

Kansas.—Westmoreland, 8th; Concordia, 7th, 8th.
Maine.—Eastport and Bangor, 3d.
Massachusetts.—Princeton, 3d; Rowe and Fall River, 3d, 4th; Amherst, 4th.
Michigan.—Northport, 12th, 13th; Birmingham, 2d; Moorestown, 11th; Escanaba, 2d, 3d, 6th; Mackinaw City, 3d, 6th.
Minnesota.—Saint Paul, 7th, 9th.
Missouri.—Lamar, 8th.
Nebraska.—Yutan, 7th to 0th; Stockham, 7th; Genoa, 2d, 7th.
Nevada.—Winnemucca, 23d.
New Jersey.—Somerville, 9th, 11th.
New York.—Menand Station, (near Albany) 3d, 4th; Albany, 4th; Humphrey 3d, 11th.
Ohio.—Garrettsville and Ruggles, 2d, 3d; North Lewisburg, 8th.
Pennsylvania.—Fallsington, 12th; Catawissa, 13th.
Rhode Island.—Point Judith, 3d, 4th.
Utah.—Nephi, 16th, 24th.
Vermont.—Strafford, 1st, 3d, 4th, 10th, 12th.
Wisconsin—La Crosse, 7th to 11th; Milwaukee and Embarras, 7th; Franklin, 11th.
Wyoming.—Fort Bridger, 24th.

PRECIPITATION.

[*Expressed in inches and hundredths.*]

The distribution of rainfall over the United States and Canada, for the month of May, 1885, as determined from reports from more than eight hundred stations, is exhibited on chart iii.

In the following table are shown, for each of the several geographical districts, the normal May precipitation for a series of years, the average for May, 1885, and the excess or deficiency as compared with the normal:

Average precipitation for May, 1885.

Districts.	Average for May, Signal-Service observations.		Comparison of May, 1885, with the average for several years.
	For several years.	For 1885.	
	Inches.	*Inches*	*Inches.*
New England	3.70	3.51	−0.19
Middle Atlantic states	2.88	3.99	+1.11
South Atlantic states	3.52	6.34	+2.82
Florida peninsula	3.15	4.67	+1.52
Eastern Gulf states	4.45	5.05	+0.60
Western Gulf states	5.39	5.07	−0.32
Rio Grande valley	2.88	8.72	+5.84
Tennessee	3.80	4.93	+1.13
Ohio valley	3.90	3.70	−0.20
Lower lake region	3.25	3.96	+0.71
Upper lake region	3.57	2.40	−1.17
Extreme northwest	3.06	1.47	−1.59
Upper Mississippi valley	4.43	2.48	−1.95
Missouri valley	3.99	4.10	+0.11
Northern slope	2.43	1.40	−1.03
Middle slope	4.09	4.51	+0.42
Southern slope	3.12	3.19	+0.07
Southern plateau	0.40	0.55	+0.15
Middle plateau	1.52	1.76	+0.24
Northern plateau	1.50	2.67	+1.17
North Pacific coast region	2.23	3.48	+1.25
Middle Pacific coast region	0.92	0.32	−0.60
South Pacific coast region	0.35	0.22	−0.13
Mount Washington, N. H.	6.85	2.29	−4.56
Pike's Peak, Colo.	4.01	6.12	+2.11

The precipitation has been in excess of the May average in the lower lake region, upper Ohio valley, Tennessee, middle and south Atlantic, and east Gulf states, portions of Kansas and Nebraska, and over an area extending from the west Gulf coast to the north Pacific coast region.

The excess has been most marked on the Atlantic coast from Florida to Virginia, in the north Pacific coast region, and in the northern plateau, where the departures are from one and one-fourth to nearly three inches, and in the Rio Grande valley, where the excess amounts to 5.84 inches.

In the upper lake region, extreme northwest, northern slope, upper Mississippi and lower Ohio valleys, Missouri, Arkansas, northeastern Texas, northern Louisiana, California, Arizona, and portions of New England and the middle Atlantic states, the precipitation has been below the average.

The most marked deficiencies occurred in the upper lake region, upper Mississippi valley, extreme northwest, and northern slope, where they varied from one to two inches.

At Milwaukee, Wisconsin, the monthly precipitation was 0.41, the May average for the last fourteen years being 3.65; at Des Moines, Iowa, there was a deficiency of 4.47, as compared with the average for the last six years.

The meteorological record forwarded by the post surgeon at Fort Ellis, Montana, shows the rainfall for May to have been remarkably heavy at that place; rain fell on eighteen days during the month, aggregating 12.26.

In the table of miscellaneous meteorological data are given the rainfalls at the various Signal Service stations with the departures from the respective normals.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations, are shown in the table of average precipitation for the several geographical districts, and also in the table of miscellaneous meteorological data. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: monthly precipitation, 3.73, is 4.48 below the May average for the three preceding years.

Georgia.—Milledgeville: monthly precipitation, 6.69, is 3.36 in excess of the May average.

Illinois.—Anna, Union county: monthly precipitation, 2.24, is 2.46 below the May average for the last ten years.

Mattoon, Coles county: monthly precipitation, 6.38, is 1.51 above the May average for the last five years.

Sycamore, DeKalb county: monthly precipitation, 1.65, is 3.11 below the May average for the four preceding years.

Riley, McHenry county: monthly precipitation, 1.72, is 1.70 below the May average for the last twenty-four years. The precipitation for the spring of 1885, is 5.98, or 2.72 below the spring average, and is the least for the above period.

Collinsville, Madison county: monthly precipitation, 2.56, is 2.16 below the May average.

Swanwick, Perry county: monthly precipitation, 4.26. is 0.04 below the May average for the last four years.

Indiana.—Vevay, Switzerland county: monthly precipitation, 2.47, is 1.06 below the May average for the last twenty-one years.

Logansport, Cass county: monthly precipitation, 5.02, is 0.80 in excess of the May average for the last twenty-six years.

Wabash, Wabash county: monthly precipitation, 4.56, is 0.28 above the May average for the last nine years.

Spiceland, Henry county: monthly precipitation, 3.73, is 0.14 above the May average for the last twenty-six years.

Kansas.—Independence, Montgomery county: monthly precipitation, 5.62, is 1.15 above the May average for the last thirteen years.

Wellington, Sumner county: monthly precipitation, 7.19, is 1.46 above the May average for the last seven years.

Yates Centre, Woodson county: monthly precipitation, 4.68, is 0.91 below the May average for the last five years. The precipitation for the spring season is 11.21, or 2.61 above the spring average.

Emporia, Lyon county: monthly precipitation, 4.18, is 0.43 below the May average.

Lawrence, Douglas county: monthly precipitation, 4.07, is 0.18 below the May average for the last eighteen years. The total precipitation for the first five months of 1885, is 13.44, or 1.38 in excess of the average for the corresponding months during the above period.

Maine.—Gardiner, Kennebec county: monthly precipitation, 3.41, (1.44 inches fell on the 31st,) is 0.50 below the May average for a period of forty-seven years.

Table of excessive, and greatest monthly precipitation—May, 1885.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.	Amount.		Date.	Amt.	Amount.
Alabama.				*Missouri.*			
Greenville	6	2.80	14.45	Sherrill			6.14
Do	21, 22	3.88		*Montana.*			
Do	30	5.85		Fort Ellis	19 to 22	4.90	12.90
Rolling			12.96	Do	26, 27	2.90	
Montgomery	22, 23	2.22	8.92	*Nebraska.*			
Do	27	2.39		Nebraska City			8.29
Do	29, 30	2.14		De Witt			7.40
Mount Willing			8.61	Madison	15	5.00	6.81
Lafayette			8.00	Sargent			6.23
Scottsborough	29	2.18	7.45	Harvard	15, 16	3.75	
Green Springs	27, 28, 29	4.75	7.35	Tecumseh	27	2.00	
Prattville			7.25	Omaha	15, 16	2.04	
Opelika			7.13	Yutan	27	2.56	
Gadsden			6.95	*New Jersey.*			
Tuscaloosa			6.91	Vineland	7	2.75	
Edwardsville			6.78	Salem	8	2.00	
Clanton			6.70	Cape May	6, 7	2.31	
Tuscumbia			6.61	*New York.*			
Birmingham	22, 23	2.05	6.48	Humphrey	30, 31	2.48	
Wetumpka			6.47	Fort Niagara	23, 24	2.10	
Mount View			6.35	*North Carolina.*			
Carrollton			6.28	New-Berne	6, 7	2.10	10.86
Fort Deposit	30	3.00		Do	18	2.46	
Arkansas.				Lenoir	22, 23	4.50	10.10
Malvern	26, 27, 28	5.39	6.11	Lincolnton	27, 28	3.44	8.79
Monticello	26	3.10		Wilmington	1	2.17	8.58
Colorado.				Do	28, 29	2.27	
Pike's Peak	1, 2	2.70	6.12	Weldon	21 to 24	3.32	8.53
Florida.				Fort Macon			7.90
Manatee	30	2.00	8.90	Cape Lookout	6, 7	2.85	7.37
Mayport	25	3.84	8.53	Scott's Hill			7.35
Jacksonville	21	2.35	7.74	Hatteras			7.04
Archer	19	2.77	6.63	Kitty Hawk			6.76
Waldo	15	2.02	6.30	Charlotte			6.47
Do	20, 21, 22	4.06		Lumberton			6.46
Tallahassee	20	2.30		Raleigh			6.40
Georgia.				Salisbury			6.37
Washington	24	2.25	8.43	Smithville	1	2.23	6.10
Do	29, 30, 31	3.45		*Pennsylvania.*			
Fort Valley			8.10	Germantown	7	2.16	
Toccoa	22, 23	2.28	8.01	West Chester	7	2.04	
Saint Mary's			7.50	HaverfordCollege	6, 7, 8	3.14	
Sandersville			7.45	Philadelphia	7, 8	2.01	
Brunswick			7.29	*Rhode Island.*			
Dalton			7.25	Nyatt Point	14, 15	2.00	
Athens			7.22	*South Carolina.*			
Griffin			6.88	Columbia	6	2.10	9.21
Newnan			6.78	Do	22, 23, 24	5.23	
Milledgeville			6.69	Aiken	6	2.00	8.03
Forsyth			6.47	Do	23, 24	2.45	
Mossy Creek			6.30	Pacolet			6.14
Gainesville			6.25	Allendale	23, 24	2.98	
Atlanta	21, 22	2.29	6.12	Do	30	2.15	
Cartersville	27, 28, 29	3.25	6.08	Cheraw	29	2.00	
Camack			6.04	*Tennessee.*			
Columbus	29, 30	3.46	6.01	Beech Grove	22, 23	2.55	7.99
Augusta	23, 24	2.43		Knoxville			7.19
West Point	29, 30	2.40		Caryville			6.44
Illinois.				Andersonville			6.31
Mattoon	28	3.71	6.38	Fostoria	26	2.60	6.17
Indiana.				Howell	26, 27	2.69	6.11
Fort Wayne	5, 6	2.00	7.09	Pulaski	27	3.20	6.07
Do	29, 30	2.15		Trenton	26	2.30	
Logansport	5, 6	2.02		Greeneville	6, 7	2.00	
Wabash	5, 6	2.08		*Texas.*			
La Grange	29	2.00		Waco	25 to 28	8.46	12.44
Yocum	6	2.00		Weimar	20	4.66	10.43
Farmland	22	2.03		Rio Grande City	8	4.35	10.28
Brookville	22	3.00		Hearne	17, 18	2.55	9.54
Indian Territory.				Do	25 to 28	5.64	
Fort Reno	16, 17, 18	5.30	9.84	Cleburne	24 to 27	5.07	9.02
Iowa.				Huntsville	17, 18	2.42	8.29
Logan	16, 17	3.20	6.00	Do	27, 28	2.73	
Do	27, 28	3.10		New Ulm	16, 17	3.14	8.01
Monticello	28, 29	2.00		Do	19	3.09	
Cedar Rapids	28, 29	2.63		San Antonio	13	2.12	7.92
Kansas.				Weatherford	20	2.00	7.59
Wellington	15, 16	2.70	7.19	Do	25, 26	3.00	
WestLeavenworth	26, 27	2.00	6.90	Fort Elliott	19, 20	3.66	7.23
Manhattan	16, 17	2.25		Brownsville	8	2.30	7.17
Clay Centre	16	2.66		Do	29	3.75	
Westmoreland	17	2.00		Dallas	25, 26	3.27	6.99
Yates Centre	16, 17	3.02		Galveston	8, 9	3.14	6.41
Independence	16	2.18		Comfort			6.14
Louisiana.				Palestine	27, 28	2.93	6.08
Grand Coteau	6	2.18	6.12	Columbia	17	2.01	
Port Eads	5	3.05	6.11	Belton	27, 28	2.22	
La Fayette	6	3.19		Honey Grove	20	2.60	
Point Pleasant	21	2.02		Indianola	17	2.33	
Delta	21	2.22		Longview	28	2.00	
Maine.				*Virginia.*			
Eastport	2	2.06		Variety Mills	22, 23	3.19	7.90
Maryland.				Bird's Nest			7.85
Ocean City	6, 7	2.54		Chincoteague	6, 7	2.63	7.22
Fallston	7	2.50		Wytheville	27, 28	2.08	7.04
Fort McHenry	6, 7	2.60		Norfolk			6.16
Michigan.				Fort Monroe	27, 28	2.24	
Escanaba	17, 18	2 37		*Wisconsin.*			
Port Huron	6	2.21		Embarras	17, 18	2.60	
Mississippi.							
Macon	27, 28, 29	6.67	7.31				

Maryland.—Fallston, Harford county: monthly precipitation. 5.28, is 2.30 in excess of the May average for the last fourteen years.

Massachusetts.—Worcester, Worcester county: monthly precipitation, 3.26, is 0.66 below the May average for the last forty-five years.

Somerset, Bristol county: monthly precipitation, 4.20, is 0.99 in excess of the May average.

Nevada.—Carson City: monthly precipitation, 0.07, is 0.22 below the average for May.

New Hampshire.—Contoocook, Merrimac county: monthly precipitation, 2.95, is about two-thirds of the May average.

New Jersey.—South Orange, Essex county: monthly precipitation, 1.18, is 1.64 below the May average for the last fifteen years. The rainfall for the spring season, 3.29, is 6.27 below the spring average and is the least recorded during the above period.

New York.—North Volney, Oswego county: monthly precipitation, 2.70, is 0.17 in excess of the May average for the last thirteen years. The total precipitation for the spring season is 6.20, or 1.43 below the average. The smallest spring precipitation (4.30) during the above period occurred in 1879; the largest (11.72) occurred in 1873.

Palermo, Oswego county: monthly precipitation, 2.29, is 0.51 below the May average for the last thirty-two years. The total precipitation for the spring season, 3.97, is the least recorded during the above period.

Ohio.—Wauseon, Fulton county: monthly precipitation, 5.61, is 1.63 in excess of the May average for the last thirteen years.

Texas.—New Ulm, Austin county: monthly precipitation, 8.01, is 1.71 in excess of the May average for the last thirteen years.

Vermont.—Woodstock, Windsor county: monthly precipitation, 2.04, is 0.74 below the May average for the last sixteen years.

Virginia.—Wytheville, Wythe county: monthly precipitation, 5.70, is 3.46 in excess of the May average for a period of twenty-two years.

Bird's Nest, Northampton county: monthly precipitation, 7.85, is larger than for any corresponding month in the last seventeen years.

Variety Mills, Nelson county: monthly precipitation, 7.90, is 5.35 above the May average for the last six years.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 3.50, is 0.93 below the May average for the last nine years.

Wisconsin.—Beloit, Rock county: monthly precipitation, 1.54, is 2.10 below the May average for a period of thirty-five years.

Sussex, Waukesha county: monthy precipitation, 0.58, is is the least recorded in May during the last ten years.

SNOW.

The dates on which snow fell in the various states and territories are as follows:

California.—Red Bluff, on mountains east of station, 18th.

Colorado.—Pike's Peak, 1st to 5th, 9th, 10th, 19th, 25th, 27th; Denver, 6th, 7th, 8th, 11th; Braddock, 16th, 17th, 18th, 27th, 28th.

Connecticut.—Bethel, 4th.

Dakota.—Fort Totten, 5th, 6th, 7th; Huron, Forts Buford, Bennett and Sully, 6th; Bismarck, Forts Yates, Randall and Pembina, 6th, 7th; Yankton, 7th; Deadwood, 6th, 7th, 10th; Fort Meade, 6th, 10th; Fort Sisseton, 6th, 7th, 8th.

Illinois.—Sycamore, 7th, 9th.

Indiana.—Logansport, 8th.

Iowa.—Dubuque, Cresco, Independence, Monticello and Muscatine, 7th; Maynard, 8th.

Kansas.—Dodge City, Maud, Salina, Oswego, Topeka, Wellington, and Yates Centre, 7th. Professor Snow of the University of Kansas at Lawrence reports that a few flakes of snow fell at that place on the 7th, which is the latest date on which snow has fallen there during a period of eighteen years.

Maine.—Eastport, Portland, Fort Preble, Cornish, Gardiner, Orono and Waterville, 2d.

Massachusetts.—Rowe, 1st, 2d, 11th; Worcester, 2d, 11th.

Michigan.—Escanaba, 3d, 7th to 10th; Grand Haven, 3d, 8th; Marquette, 7th to 10th; Alpena, 8th, 9th, 10th; Port Huron, 8th, 9th; Mackinaw City, 4th, 5th, 7th, 8th; Lansing, 7th, 8th, 9th; Northport, 7th, 8th; Mottville, 3d, 7th, 9th, 10th; Thornville, 10th.

Minnesota.—Duluth, 6th, 7th; Moorhead and Saint Paul, 6th, 7th, 8th; Saint Vincent, 5th to 8th; Northfield, 1st, 6th, 7th, 8th.

Missouri.—The report of the "Missouri Weather Service" states that snow fell in different parts of the state on the 6th and 7th.

Montana.—Forts Maginnis and Shaw, 6th; Poplar River, 6th, 7th; Helena, 7th; Fort Ellis, 7th, 21st, 22d, 23d.

Nebraska.—Fort Robinson, 10th; Yutan, 19th.

Nevada.—Winnemucca and Fort McDermitt, 13th, 22d; Carson City, 13th.

New Hampshire.—Mount Washington, 2d, 4th, 5th, 6th, 8th, 9th, 10th.

New Jersey.—Dover, 4th.

New York.—Albany, 1st; Oswego, 4th, 8th, 9th, 10th; Rochester, 8th, 10th; Buffalo, 9th; Madison Barracks, 5th, 9th; Humphrey, 4th; Ithaca, 10th.

Ohio.—Cleveland, Sandusky, Toledo and Garrettsville, 9th.

Oregon.—Fort Klamath, 20th, 21st.

Pennsylvania.—Pittsburg, 3d, 10th; Erie, 9th; Grampain Hills, 11th; Wysox, 4th.

Vermont.—Strafford, 7th.

Wisconsin.—La Crosse, 7th, 8th, 9th; Franklin, 9th; Prairie du Chien, 7th, 8th.

Wyoming.—Cheyenne, 6th, 7th; Fort Fred Steele, 8th; Fort Bridger, 8th, 14th, 15th, 18th.

MONTHLY SNOW-FALLS.

[*Expressed in inches and tenths.*]

Monthly snow-falls of one inch or more were reported from the various states and territories during the month as follows:

California.—Summit, 10; Cisco, 3; Emigrant Gap, 2.

Colorado.—Pike's Peak, 43.8; Braddock, 11.2.

Dakota.—Deadwood, 5; Richardton, 3; Webster, 1.8; Fort Yates, 1.5.

Maine.—Orono, 8; Gardiner, 5; Belfast, 3.

Michigan.—Escanaba, 1.1; Northport and Thornville, 1.

Minnesota.—Saint Vincent, 2.1; Moorhead, 2.

Nevada.—Otego, 2; Wells, 1.

New Hampshire.—Mount Washington, 6.1.

New York.—Humphrey, 6.2; Factoryville, 1.

Ohio.—Garrettsville, 2; Cleveland, 1.1.

Pennsylvania.—Troy, 1.2; Wellsborough, 1.1.

Vermont.—Dorset, 1.

Wisconsin.—Neillsville, 5.2.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF THE MONTH.

[*Expressed in inches and tenths.*]

Colorado.—Pike's Peak, 18.

New Hampshire.—Mount Washington, trace.

New Mexico.—Santa Fé, none in valleys, 24 on mountains.

HAIL.

Petersburg, Virginia: during the afternoon of the 1st a hail-storm occurred in this vicinity, causing great damage to growing cotton, corn, and vegetables.

Hickory, Catawba county, North Carolina: a severe hail-storm occurred on the 1st; a large number of trees were blown down and other damage caused.

Bruington, King and Queen county, Virginia: during the afternoon of the 1st two hail-storms, separated by an interval of one hour, occurred at this place. The first lasted about ten minutes, the second being of shorter duration. Some of the hail-stones were more than one inch in diameter. But little damage was done.

Wellington, Sumner county, Kansas: a hail-storm occurred on the 5th, the hail-stones measuring one and one-half inches in diameter; considerable damage was done to fruit trees.

Fort Laramie, Wyoming: at 6.05 p. m. on the 17th, a thunder storm, accompanied by heavy hail, passed over this place. The hail-stones varied from one-fourth inch to one inch in diameter. During the fall of hail only about one-tenth of the sky (overhead) was covered with cloud.

Brownsville, Texas: reports from Point Isabel, about twenty-five miles north of this place, state that a severe hail-storm occurred there between 4 and 5.30 p. m. on the 17th. The storm was accompanied by high wind, the velocity being estimated at fifty miles per hour; the hail-stones were unusually large and covered the ground to a depth of three inches. The crops in the vicinity of Point Isabel were completely destroyed and several trees and temporary buildings were blown down. Many windows were broken and the roofs of buildings damaged.

La Cygne, Linn county, Kansas: a severe hail-storm occurred at this place during the early morning of the 24th, causing damage estimated at from $2,000 to $3,000.

Abilene, Dickinson county, Kansas: a severe hail-storm occurred here during the early morning of the 27th. Many windows were broken by the hail-stones.

North Lewisburg, Champaign county, Ohio: a fall of hail occurred at 5.40 p. m. on the 31st, causing considerable damage. Some of the hail-stones were one inch in diameter.

Hail-storms of less severity, and which caused no serious injury, were reported from the various states and territories, as follows:

Arizona.—Fort Apache, 2d; Fort Verde and Wickenburg, 3d; Prescott, 8th.

California.—Red Bluff and Princeton, 12th.

Colorado.—Pueblo, 17th; West Las Animas, 19th; Colorado Springs, 26th; Pike's Peak, 27th, 30th.

Connecticut.—North Colebrook, 10th, 11th.

Dakota.—Fort Bennett, 14th, 15th; Webster, 20th; Huron, 20th, 31st.

Florida.—Archer, 1st; Jacksonville, 15th.

Idaho.—Boisé City, 4th; Cœur d'Alene, 20th; Albion, 30th, 31st.

Illinois.—Charleston, 24th; South Evanston, 29th.

Indiana.—Logansport and Wabash, 5th; Lafayette, 6th; Sunman and Fort Wayne, 24th.

Iowa.—Independence, 4th, 6th; Cresco, 6th, 8th; Keokuk, 17th.

Kansas.—Yates Centre, 7th, 24th; Concordia, 15th; Wellington and Maud, 15th, 16th; Westmoreland, 15th, 23d; Clay Centre, 16th; Allison, 16th, 23d; Independence and Oswego, 24th; Emporia, 24th, 26th, 27th, 30th; Fort Scott and Leavenworth, 27th.

Kentucky.—Richmond, 30th.

Louisiana.—Luling, 14th; New Orleans, 30th.

Massachusetts.—Worcester, 2d, 11th; Williamstown, 10th, 31st.

Michigan.—Hudson, 9th; Detroit, 9th, 31st; Kalamazoo and Birmingham, 31st.

Minnesota.—Moorhead, 23d.

Missouri.—Lamar, 24th.

Montana.—Fort Maginnis, 4th; Fort Shaw, 21st.

Nebraska.—North Platte, 4th; Fremont, 6th; De Soto and Crete, 15th.

Nevada.—Winnemucca, 20th.

New Mexico.—Gallinas Spring, 4th.

New York.—Factoryville, 10th, 11th; Ithaca, 31st.

North Carolina.—Charlotte and Weldon, 1st; Wilmington and Blackwell, 25th.

Ohio.—Toledo, 4th; Tiffin, 4th, 9th; Cleveland and Sandusky, 9th; Westerville, 19th; Warren, 24th; Columbus, Portsmouth and Yellow Springs, 31st.

Oregon.—Roseburg, 13th, 22d; Ashland, 21st.

Pennsylvania.—Wysox, 10th, 11th; Pittsburg, 19th.
South Carolina.—Stateburg, 1st.
Tennessee.—Ashwood, 6th; Nashville, 23d; Austin, 30th.
Texas.—Fort Davis, 3d; Cleburne, 5th, 27th; El Paso and Rio Grande City, 8th; Brownsville, 8th, 20th; San Antonio, 13th; New Ulm, 19th; Fort Concho, 24th.
Utah.—Salt Lake City, 4th, 13th, 31st; Nephi, 9th, 17th.
Vermont.—Charlotte, 10th.
Virginia.—Wytheville, 1st; Variety Mills, 25th.
Wisconsin.—Prairie du Chien, 6th; Embarras, 8th.
Wyoming.—Fort Bridger, 15th, 20th.

SLEET.

Pike's Peak, Colorado, 1st, 2d, 6th, 7th, 10th, 12th, 13th, 15th, 16th, 17th.
Fort Buford, Dakota, 7th.
Boisé City, Idaho, 22d.
Anna, Illinois, 7th.
Cresco, Iowa, 7th.
Fort Scott and Dodge City, Kansas, 7th.
Eastport, Maine, 2d.
Alpena, Michican, 7th.
Escanaba, Michigan, 8th.
Saint Vincent and Saint Paul, Minnesota, 8th.
Lamar, Missouri, 7th.
Mount Washington, New Hampshire, 8th.
Garrettsville, Ohio, 9th.
Cleveland, Ohio, 9th, 10th.

PRECIPITATION FROM A CLOUDLESS SKY.

Humphrey, New York: snow fell from a cloudless sky at 9.30 p. m. of the 10th.

El Paso, Texas: light rain fell from 8.45 to 8.53 p. m. on the 7th, when the sky overhead was perfectly clear, and no clouds were observed within 45° of the zenith.

COTTON REGION REPORTS.

A system of temperature and rainfall observacions was begun in the spring of 1882 in the cotton-growing districts of the South. These observations have been continued since in each year from April to October, inclusive, and were resumed May 1, 1885, one month later than in the preceding years.

In the following table are given the average rainfall and the means of the maximum and minimum temperatures for the several districts as shown on the chart issued with the REVIEW for April, 1882. For the purpose of comparison the averages for these districts during the three preceding years are also given. In the districts of Little Rock, New Orleans, Memphis, and Vicksburg, large deficiencies in the rainfall are shown, while a marked excess occurs in the districts of Wilmington, Atlanta, Augusta, and Montgomery. The mean of the maximum and minimum temperatures differs but slightly from the average for the previous years.

Temperature and rainfall data for the cotton districts, May, 1885.

Districts.	Rainfall.			Temperature.							
				Maximum.			Minimum.			Extremes for May, 1885.	
	Average for May of three preceding years.	Average for May, 1885.	Departures.	Mean for May of three preceding years.	Mean for May, 1885.	Departures.	Mean for May of three preceding years.	Mean for May, 1885.	Departures.	Max.	Min.
				°	°	°	°	°	°	°	°
New Orleans	6.24	3.12	— 3.12	83.9	82.9	— 1.0	63.0	61.4	— 1.6	105	57.6
Savannah	2.89	3.83	+ 0.85	86.0	84.0	— 2.0	61.9	62.1	+ 0.2	99	57.9
Charleston	3.43	3.56	+ 0.13	83.5	82.4	— 1.1	59.6	59 0	— 0.6	95	40.0
Atlanta	2.18	5.56	+ 3.38	81.2	79.9	— 1.3	56.4	56.6	+ 0.2	96	27.0
Wilmington	2.70	6.76	+ 4.06	81.3	79.9	— 1.4	56.1	56.2	+ 0.1	94	41.7
Memphis	5.31	2.82	— 2.49	79.5	78.5	— 1.0	56.6	55.9	— 0.7	97	54.7
Galveston	6.54	6.49	— 0.05	84.4	82.1	— 2.3	62.5	61.1	— 1.4	96	57.3
Vicksburg	6.14	4.75	— 1.39	82.2	81.2	— 1.0	60.7	62.5	+ 1.8	99	54.5
Montgomery	2.31	5.99	+ 3.68	84.1	81.8	— 2.3	58.2	60.4	+ 2.2	96	54.3
Augusta	2.45	5.32	+ 2.87	83.7	82.3	— 1.4	58.9	58.4	— 0.5	95	54.9
Little Rock	6.96	2.51	— 4.45	79.7	80.0	+ 0.3	55.5	54.5	— 1.0	96	47.8
Mobile	3.83	4.35	+ 0.52	82.9	84.7	— 1.8	59.4	62.2	+ 2.8	97	58.5

WINDS.

The most frequent directions of the wind during May, 1885, are shown on chart ii. by arrows flying with the wind; they are also given in the table of miscellaneous data. In the extreme northwest, upper Mississippi and Missouri valleys, the prevailing winds were from north to northwest; along the south Atlantic and east Gulf coasts they were from southeast to southwest; on the middle Atlantic coast they were from east to northeast; in other districts they were variable.

HIGH WINDS.

(In miles per hour.)

Wind-velocities of fifty miles, or more, per hour were reported as follows:

Mount Washington, New Hampshire, 98 nw., 2d; 85 nw., 3d; 53 s., 7th; 70 s., 8th; 63 nw., 15th; 57 w., 16th; 50 nw., 19th; 57 nw., 20th; 70 nw., 26th; 62 nw., 27th; 60 se., 31st.
Pike's Peak, Colorado, 74 sw., 15th; 64 sw., 18th; 72 sw., 22d; 56 nw., 28th.
Block Island, Rhode Island, 52 ne., 14th.
Dodge City, Kansas, 58 se., 15th.
Indianola, Texas, 50 n., 8th; 50 ne., 17th.
Sandy Hook, New Jersey, 50 e., 1st.

LOCAL STORMS AND TORNADOES.

Ogreeta, Cherokee county, North Carolina: a tornado occurred three miles south of this place at 11.45 a. m. on the 1st. The tornado-cloud was funnel-shaped and was accompanied by rain and hail. Considerable damage was done.

Portsmouth, North Carolina: a violent thunder-storm, accompanied by high wind and heavy rain, prevailed from 7.45 to 8.35 p. m. on the 1st. A number of houses were slightly damaged.

The "New York Herald," of May 8, 1885, contained the following:

LITTLE ROCK, ARK., *May* 7, 1885.—Reports from Indian Territory state that one of the most fearful storms ever known in that section occurred near Mount Scott on the 5th. It began in the evening with a southerly wind with a force of eighty miles an hour, and increased through the night, with terrific thunder and lightning and a driving rain. The forest for miles was swept away by the wind, and the destruction of everything in its broad path is complete.

In localities further north the destruction of cabins and dug-outs, occupied by cattle herders, is reported, and several lives are said to have been lost.

New Market, Madison county, Alabama: a tornado occurred at this place at 6.30 p. m. on the 6th. The tornado-cloud was funnel-shaped and moved in a path N. 45° E. for a distance of nine miles; it was but a few seconds in passing a given point. The masonic temple, a church, and some other buildings were destroyed, entailing a loss aggregating $20,000.

Buchanan, Haralson county, Georgia: a tornado occurred six miles east of this place at 9 p. m. on the 9th. It moved N. 45° E., and was most destructive in a track about five hundred feet wide. Hail preceded the tornado and rain fell both before and after it. Three houses were destroyed and others damaged; several persons were injured.

Warren, Lincoln county, Nebraska: at 2.30 p. m. on the 15th a tornado occurred. The cloud was funnel-shaped and moved N. 30° E. for a distance of two miles. Two houses were destroyed.

Kingman, Kingman county, Kansas: a tornado occurred west of this place at 5 p. m. on the 15th. The cloud was funnel-shaped and moved in a northeasterly direction for a distance of one and one-half miles, the width of the tornado's path being about three hundred and thirty feet. Several buildings were destroyed. The tornado was followed by heavy rain. Another tornado occurred at Kingman on the 16th, at 6 p. m., causing but slight damage.

At 4 p. m. on the 15th, a tornado occurred in the eastern part of Rooks county, Kansas. It moved in a north-northeasterly direction for a distance of eighteen miles, at a velocity of about forty miles per hour. The width of destructive path was from 1,320 to 2,640 feet. Rain and hail fell both before

and after the passage of the tornado. Observers report that the funnel-shaped cloud had a rotary motion contrary to the movement of the hands of a watch. One person was killed and twelve were injured. Nineteen houses were blown down. The total damage is estimated at $50,000.

Caldwell, Sumner county, Kansas: a tornado occurred here during the night of the 15–16th, causing considerable damage.

Minneapolis, Ottawa county, Kansas: a tornado occurred in the southern part of this county on the 16th. A number of buildings were blown from their foundations, while others were less seriously injured. The tornado appears to have started south of Solomon river and ended at Bennington.

Kirwin, Phillips county, Kansas: ten houses were destroyed and twenty-five persons injured by a tornado which occurred at 4 p. m. on the 16th. A number of horses and cattle were also killed.

Maud, Kingman county, Kansas: a tornado occurred eight miles west of this place on the 16th. Some small buildings were destroyed.

Westmoreland, Pottawatomie county, Kansas: a tornado began about two miles northeast of station on the 16th. As it passed to the northward it increased in violence, destroying fencing, orchards, &c.

New London, Connecticut: a southeasterly storm began at 12.30 and ended at 4.15 p. m. on the 16th. A maximum wind velocity of thirty-two miles per hour was recorded at 1.25 p. m. The storm was of local character and was confined to the Thames valley, extending over an area ten miles in length and four miles in width.

Greeley, Wild county, Colorado: at 2.20 p. m., on the 18th, a tornado occurred two and one-half miles east of this place. The tornado cloud moved in a north-northeasterly direction, destroying everything in a path six hundred feet wide. It was preceded by rain and hail and followed by rain. The gyratory motion of the cloud is said to have been with the hands of a watch.

Huron, Dakota: at 5.15 p. m., on the 20th, a thunderstorm began with wind from southwest. At 6 p. m. the wind increased to the force of a gale, and for five minutes blew at the rate of fifty miles per hour. A number of outbuildings, signs, etc., were blown down. Considerable damage was done by lightning. The storm moved from southwest to northeast; it was accompanied by small hail, the hailstones being about the size of peas. A thunder-storm, with small hail, also prevailed from 4.45 to 5.15 p. m., on the 31st, at which time a destructive storm is reported to have occurred ten miles south of Huron.

Winnipeg, Manitoba: a tornado passed in an easterly direction over the northwestern outskirts of this place during the afternoon of the 21st. The roofs were blown from several buildings. When the tornado struck the river a large waterspout was formed. A similar storm, also moving eastward, passed to the south of the city at the same time.

Saint Louis, Missouri: during the morning of the 24th the weather was warm and sultry; at 6.48 p. m. the wind suddenly veered from south to west and then gradually to northwest, blowing in violent gusts; for five minutes, ending at 6.53, it blew at the rate of forty-seven miles per hour. Three buildings in this city were struck by lightning and damaged during the storm.

Columbus, Ohio: a violent thunder-storm prevailed during the afternoon of the 24th. The rainfall was very heavy and caused the river to rise rapidly; several small bridges were washed away. Considerable damage was done by lightning.

Johnstown, Licking county, Ohio: during the afternoon of the 24th a violent storm of rain, hail, and wind prevailed at this place. The heavy rain caused the streams to overflow and many bridges and fences were washed away.

Cincinnati, Ohio, 25th: reports from Concord, Lake county, Ohio, state that during the afternoon of the 24th a severe storm of rain and wind caused damage to wheat fields in that vicinity.

Denton, Denton county, Texas: a severe storm occurred here during the afternoon of the 24th, causing considerable damage to the wheat and oat crops. The heavy rainfall caused the streams to rise to such an extent as to interrupt travel.

Alton, Madison county, Illinois: a tornado occurred during the night of the 24–25th. It approached from the southwest and caused serious damage to several large buildings on the river front. The damage throughout the city will aggregate a large amount.

Strawn, Palo Pinto county, Texas: a store was blown down during a severe storm on the night of the 24–25th. The heavy rain caused serious injury to the wheat crop.

Council Bluffs, Iowa: a violent and destructive storm occurred here on the afternoon of the 25th. The Exhibition building was completely destroyed and a number of others were damaged.

Morgan, Bosque county, Texas: at about 6 p. m. on the 27th a severe storm occurred at this place. Many out-buildings were overturned and numerous substantial buildings were damaged.

Mexia, Limestone county, Texas: during a storm of considerable severity at this place on the morning of the 27th, a store-house was unroofed and several trees were blown down.

Whiting, Jackson county, Kansas: at noon on the 27th a tornado passed near this place, moving in a northeasterly direction. The width of the path of destruction was three hundred feet. Two buildings were destroyed.

Goff's, Nemaha county, Kansas: a tornado occurred at this place at 11.30 a. m. on the 27th. The funnel-shaped cloud moved E. 40° N. in a path three hundred and thirty feet wide. The railroad station, four dwellings and several out-buildings were destroyed. Five persons were seriously injured.

Nortonville, Jefferson county, Kansas: a tornado occurred here at 12.15 p. m. on the 27th. It moved in a northeasterly direction for a distance of twelve miles, the path of greatest destruction being about thirty feet wide. The railroad station was damaged and two houses and some coal sheds were destroyed. The damage is estimated at $3,000.

Frankfort, Marshall county, Kansas: a tornado occurred on the 27th, at 10.40 a. m. The cloud moved in a northeasterly direction, the width of the path of greatest destruction being but fifteen feet. Five large outbuildings were destroyed.

Ansonville, Anson county, North Carolina: at 6.30 p. m. on the 27th, a tornado destroyed several buildings at this place. The tornado-cloud was funnel-shaped and moved in an easterly direction. Two persons were injured.

Yorkville, York county, South Carolina: a tornado occurred eight miles west of this place at 3 p. m. on the 27th. The tornado moved in an east-northeasterly direction for a distance of twenty-five miles, its path being five hundred feet in width. Three houses were blown down and many unroofed.

Charlotte, North Carolina: a tornado passed in an easterly direction, near Matthews, Mecklenburg county, at about 6 p. m. on the 27th; it crossed the Carolina Central railroad about four miles from Charlotte, where several large trees were blown across the track. Many buildings in the vicinity of Matthews were destroyed.

Greensborough, Hale county, Alabama: a tornado occurred near Demopolis, Marengo county, about thirty miles southwest of this place, on the 28th. Buildings, fencing, and trees were blown down.

Vevay, Switzerland county, Indiana: at 7.20 p. m. on the 30th, a well-defined tornado-cloud was observed passing to the northwest of this place. It disappeared at 7.40 p. m. without having descended to the ground.

New Orleans, Louisiana: a severe storm prevailed at the United States barracks, about six miles south of the city, at 2.30 p. m. on the 30th. Several trees were blown down and the steamer "John W. Cannon" narrowly escaped capsizing. Heavy rain, with hail from 2.30 to 2.45 p. m., fell at New Orleans.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger points at the various river stations; the highest and lowest stages for May, 1885, with dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, May, 1885.

[*Expressed in feet and tenths.*]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, Louisiana	29 9	11, 12	30 5	1	21 1	9 4
Arkansas:						
Fort Smith, Arkansas	15 0	20	19 2	14	8 5	10 7
Little Rock, Arkansas	23 0	1	24 0	18	9 7	14 3
Missouri:						
Yankton, Dakota	24 0	30	13 0	14, 15	8 3	4 7
Omaha, Nebraska	18 0	31	9 5	17	7 2	2 3
Leavenworth, Kansas	20 0	30, 31	11 9	16	9 3	2 6
Mississippi:						
Saint Paul, Minnesota	14 5	1	7 0	22	4 6	3 4
La Crosse, Wisconsin	24 0	3, 4, 5	10 4	31	7 5	2 9
Dubuque, Iowa	16 0	6, 7	12 5	24	8 8	3 7
Davenport, Iowa	15 0	9	10 0	26	6 5	3 5
Keokuk, Iowa	14 0	9	10 8	28	6 9	3 9
Saint Louis, Missouri	32 0	3	26 1	27	17 6	8 5
Cairo, Illinois	40 0	1	36 7	28	20 0	16 7
Memphis, Tennessee	34 0	1, 2, 3	38 2	31	14 2	14 0
Vicksburg, Mississippi	41 0	.....	.....	.....	.....	.....
New Orleans, Louisiana*	—3 0	16, 17	— 2 3	31	— 4 1	1 8
Ohio:						
Pittsburg, Pennsylvania	22 0	26, 31	7 1	21	3 2	3 9
Cincinnati, Ohio	50 0	31	20 0	23, 24	10 8	9 2
Louisville, Kentucky	25 0	1	8 8	24, 25	5 5	3 3
Cumberland:						
Nashville, Tennessee	40 0	31	22 1	22	4 6	17 5
Tennessee:						
Knoxville, Tennessee	.....	.....	.....	.....	.....	.....
Chattanooga, Tennessee	33 0	31	14 0	20	3 4	10 6
Monongahela:						
Pittsburg, Pennsylvania	29 0	26, 31	7 1	21	3 2	3 9
Savannah:						
Augusta, Georgia	32 0	25	13 8	11 to 20	6 5	7 3
Mobile:						
Mobile, Alabama	.....	6	18 9	23	15 0	3 9
Sacramento:						
Red Bluff, California	.....	1–8, 14	1 2	28 to 31	0 8	0 4
Sacramento, California	.....	7, 8	13 9	31	11 0	2 9
Willamette:						
Portland, Oregon	.....	24	13 8	1, 2	6 4	7 4
Colorado:						
Yuma, Arizona	.....	21, 22	22 0	5, 6	18 3	3 7

* Below high-water mark of 1874 and 1883.

In the Mississippi river, from Memphis northward, the highest stages of water occurred between the 1st and 9th, and the lowest stages between the 22d and 31st. At New Orleans, Louisiana, the river was highest on the 16th and 17th, and lowest on the 31st.

The Missouri river reached its lowest stage about the middle of the month and was highest on the 30th and 31st.

The Ohio was lowest between the 21st and 25th. It was highest at Louisville, Kentucky, on the 1st; Cincinnati, Ohio, on the 31st, and Pittsburg, Pennsylvania, on the 26th and 31st.

The Red river at Shreveport, Louisiana, passed the danger line on the 10th, and reached its highest stage on the 11th, when it was six-tenths of a foot above the danger line.

ICE IN RIVERS AND HARBORS.

Buffalo, New York: floating ice fields were observed in the river on the 5th. The river and lake were free from ice on the 15th.

Oswego, New York, 6th: the harbor was free from ice on the 6th. The first vessel (schooner "Vienna") of the season arrived on the above date.

Erie, Pennsylvania: the tug "Mattison" was surrounded by an ice-floe near this port on the 2d, and narrowly escaped being wrecked.

Escanaba, Michigan: a field of ice was encountered by the steamer "Lady Washington" off Light House Point on the 5th. The first boat of the season, from Lake Michigan, arrived on the 8th.

Milwaukee, Wisconsin: the propeller "Alcona," from Toledo, Ohio, reached this port on the 6th, being the first boat of the season to arrive *via* Strait of Mackinac.

Duluth, Minnesota: Lake Superior was free from ice on the 1st; on the 2d, small quantities of floating ice were observed. The propeller "Samuel F. Hodge" left this port on the 6th for the lower lakes. The propeller "Arizona" arrived from the lower lake ports on the 14th, being the first arrival of the season *via* Strait of Mackinac.

Marquette, Michigan: the steamers "Arizona," "Osceola," and "Peerless," reached the port during the night of the 11–12th, being the first arrivals of the season.

Mackinaw City: on the 1st the steamer "Van Raalte" was the first steamer of the season to pass through the Strait of Mackinac.

Petoskey, Michigan: Little Petoskey bay was entirely free from ice on the 7th, when the navigation was resumed.

Fort Totten, Dakota: on the 4th, Fort Totten bay was free from ice. On the 6th, a large ice-floe came into the bay, and in some places along the shore the ice was piled to a height of six feet; the bay was again free from ice on the 7th. Navigation was resumed on the 11th, being the same date on which it was resumed in 1884.

HIGH TIDES.

Little Egg Harbor, New Jersey, 14th.
New York City, 8th.
New River Inlet, North Carolina, 26th.
Fort Macon, North Carolina, 15th, 16th.

LOW TIDES.

Indianola, Texas, 10th.

FLOODS.

Laredo, Texas: the heavy rains on the 7th and 8th caused numerous washouts on the railroads. A large part of the town was inundated, the water being four feet deep in some places.

Rio Grande City, Texas; from 10.40 a. m. to 1.30 p. m. on the 8th, 3.49 inches of rain fell, and 3.00 inches of this amount fell in one hour and five minutes—from 11.15 to 12.10. The streets were flooded in some places to a depth of two and one-half feet. From 11 a. m. to 11 p. m. the Rio Grande river rose twenty feet, overflowing the lowlands south of the city. Serious washouts occurred on the railroads to the northward, completely cutting off communication with other points. The river continued to rise during the night, and by 8 a. m. on the 9th it was twenty-nine feet above low water. At an average stage the Rio Grande river at this point is but one hundred yards wide; on the 9th its width was about five miles, extending from the plaza in Rio Grande City to Camargo, Mexico. More than two thousand acres of growing crops between Rio Grande City and Camargo were inundated. At noon on the 9th the river became stationary, and at 9 p. m. began to fall slowly.

Edinburg, Texas, 11th: the recent heavy rains caused the Rio Grande river to overflow, submerging a large area of planted corn.

San Antonio, Texas: a very heavy rainfall occurred on the 13th, flooding the western part of the town. The water entered many houses, and one house was moved from its foundation.

Elk Falls, Elk county, Kansas: during the afternoon of the 15th one of the heaviest rain-storms occurred that has ever been experienced in this vicinity. The lowlands were inundated and several lives lost. The railroads were badly washed.

Independence, Montgomery county, Kansas: the heavy rains during the night of the 15–16th caused Elk and Verdigris creeks to overflow. Six persons were drowned in Card creek, seven miles west of Independence. A large number of cattle were drowned and many bridges were washed away. Elk creek reached a height four feet higher than in any previous flood. Verdigris creek was also higher by sixteen inches than ever before known.

Montrose, Colorado: a "cloud-burst" occurred on the north side of Horse-Fly mountain on the 17th. Several culverts along Horse-Fly gulch were washed away and the roads were rendered impassable.

Caldwell, Burleson county, Texas: during the night of the 25-26th the heaviest rainfall of the season occurred. The creeks rose to a greater height than has been known for many years.

Austin, Texas: a freshet occurred here during the night of the 25-26th, causing much damage. Bouldin's and Barton's creeks overflowed, the former being higher than ever before known. Two bridges over Bouldin's creek, near Austin, were washed away. Onion creek, a large tributary to the Colorado river, reached its highest stage since 1869, and overflowed a number of farms along its banks.

Navasota, Grimes county, Texas: the heaviest rain for many years fell during the night of the 25-26th. Two bridges at this place, over Cedar creek, were washed away.

Dallas, Texas: the heavy rains of the 26th caused the Trinity river to overflow, submerging the turnpike to the west of this place.

Mexia, Limestone county, Texas: on the 26th the Navasota river was reported to have been higher than known for several years.

Indianola, Red Willow county, Nebraska: a "cloud-burst" occurred near the Republican river during the evening of the 26th. Eleven of a party of seventeen persons who were encamped in Richman canyon were drowned. The canyon was flooded to a depth of fifteen feet.

Halifax, Nova Scotia: reports from Annapolis county state that on the 27th a remarkably heavy rain fell over an area three miles in length by five or six miles in width. The streams rose to dangerous heights. At Port Lorne numerous bridges and a mill were washed away.

Valley Mills, Bosque county, Texas: a remarkably heavy rainfall occurred here during the night of the 27–28th. Two thousand feet of railroad track and two culverts were washed away between this place and Clifton, a few miles northward. The Bosque river rose to a greater height than ever before known, overflowing farms along its banks and causing a large amount of damage. Several families were compelled to abandon their houses. Reports from Meridian on the 28th stated that the damage caused by the flood in Bosque county was estimated at $100,000.

Waco, McLennan county, Texas: the most destructive flood ever known here occurred on the 28th. A violent storm accompanied by very heavy rainfall prevailed during the night of the 27–28th. The Brazos river reached a point two feet above high water mark, and the fine cotton plantations along its banks were completely submerged. On the evening of the 30th the Brazos had fallen seven feet, but there were still about one hundred and fifty dwellings and business houses submerged. Seventeen bridges in McLennan county were washed away by the flood. It is estimated that the damage, independent of that sustained by the railroads, will aggregate $100,000.

Evansville, Indiana: a very heavy fall of rain occurred during the afternoon of the 28th. Damage estimated at $2,000 was caused by flooding of cellars in the northern part of the town.

Longview, Gregg county, Texas: the upper Sabine river overflowed on the 29th.

Laredo, Texas: on the 29th the Trio river was reported to have been six feet higher than ever before known.

Marlin, Falls county, Texas: on the 30th the surrounding country for a distance of several miles from the Brazos river was entirely submerged, resulting in great damage to all kinds of crops and the loss of much stock.

Calvert, Robertson county, Texas: on the 31st the Brazos river was five feet higher than any previous flood mark, and thousands of acres of land under cultivation were flooded.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for May, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
	°	°	°		°
Atlantic City, New Jersey	63.7	50.7	13.0	4 9	54.8
Alpena, Michigan	60.5	40.0	20.5	12 2	46.5
Augusta, Georgia	74.5	65.2	9.3	8 0	70.0
Baltimore, Maryland	67.8	57.9	9.9	10 7	63.0
Block Island, Rhode Island	56.7	43.4	13.3	8 1	50.7
Boston, Massachusetts	55.8	43.3	12.5	19 7	52.3
Buffalo, New York	57.5	33.8	23.7	8 9	53.1
Canby, Fort, Washington Territory	60.2	51.1	9.1	14 4	52.6
Cedar Keys, Florida	82.9	74.7	8.2	7 9	75.1
Charleston, South Carolina	76.4	69.0	9.4	41 5	72.7
Chicago, Illinois	64.1	48.9	15.2	8 0	52.8
Chincoteague, Virginia	73.0	56.0	17.0	3 8	59.9
Cleveland, Ohio*	57.0	45.8	11.2	14 0	55.6
Detroit, Michigan	56.2	41.0	15.2	24 4	56.8
Duluth, Minnesota	53.1	35.6	17.5	9 9	47.0
Eastport, Maine	40.7	36.6	4.1	14 7	47.5
Escanaba, Michigan*	60.1	34.3	25.8	18 2	47.6
Galveston, Texas	82.5	70.5	12.0	12 9	76.2
Grand Haven, Michigan	69.0	46.2	22.8	19 0	52.9
Indianola, Texas	84.5	68.5	16.0	9 3	75.0
Jacksonville, Florida	83.4	73.4	10.0	18 0	73.7
Key West, Florida	87.2	82.2	5.0	17 0	80.4
Mackinaw City, Michigan*	47.5	35.8	11.7	10 0	44.4
Macon, Fort, North Carolina					
Marquette, Michigan					
Milwaukee, Wisconsin	50.8	41.9	8.9	8 0	49.7
Mobile, Alabama	81.3	71.0	10.3	17 3	71.7
New Haven, Connecticut	64.5	45.5	17.0	16 8	54.9
New London, Connecticut	55.7	43.4	12.3	12 2	54.5
New York City	60.0	48.0	12.0	13 8	56.2
Norfolk, Virginia	72.1	59.8	12.3	16 6	65.1
Pensacola, Florida	83.1	69.5	13.6	17 4	72.8
Portland, Maine	50.1	44.0	6.1	17 5	54.8
Portland, Oregon	64.2	53.8	10.4	61 5	58.9
Sandusky, Ohio	68.5	47.8	20.7	10 7	56.7
Sandy Hook, New Jersey	60.4	47.6	12.8	1 8	54.6
San Francisco, California	60.3	56.2	4.1	35 6	57.2
Savannah, Georgia	80.0	71.3	8.7	9 4	73.3
Smithville, North Carolina	79.0	66.0	13.0	10 6	69.2
Toledo, Ohio	70.2	47.5	22.7	13 0	57.9
Wilmington, North Carolina	78.1	68.4	9.7	14 4	70.1

* Record for the month incomplete—see text.

At Cleveland, Ohio, no observation was made on the 3d, owing to breakage of the instrument; at Escanaba, Michigan, observations were interrupted by ice on the 4th and 5th; at Mackinaw City, Michigan, no observations were made, on account of ice, from the 1st to the 6th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for May, 1885, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 83.27 per cent. The percentages for the four elements are: Weather, 87.03; direction of the wind, 81.25; temperature, 81.03; barometer, 85.52 per cent. By geographical districts, they are: For New England, 79.14; middle Atlantic states, 82.86; south Atlantic states, 83.22; eastern Gulf states, 87.71; western Gulf states, 87.11; lower lake region, 79.68; upper lake region, 77.61; Ohio valley and Tennessee, 84.20; upper Mississippi valley, 83.69; Missouri valley, 80.55; north Pacific coast region, 82.31; middle Pacific coast region, 85.67; south Pacific coast region, 95.03. There were three omissions to predict out of 3,543, or 0.01 per cent. Of the 3,540 predictions that have been made, seventy-four, or 2.09 per cent., are considered to have entirely failed; one hundred and sixty-five, or 4.66 per cent., were one-fourth verified; four hundred and sixty-three, or 13.08 per cent., were one-half verified; six hundred and fifty-two, or 18.42 per cent., were three-fourths verified; 2,186, or 61.75 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During May, 1885, one hundred and sixty-eight cautionary signals were ordered. Of these, ninety-four, or 55.95 per cent.,

were justified by winds of twenty-five miles or more per hour, at or within one hundred miles of the station. Twenty-one off-shore signals were ordered, of which number, eight, or 38.10 per cent., were fully justified both as to direction and velocity; twenty-one, or 100.0 per cent., were justified as to direction; and eight, or 38.10 per cent., were justified as to velocity. One hundred and eighty-nine signals of all kinds were ordered, one hundred and two, or 53.97 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, fourteen were changed from cautionary. Three signals were ordered late. In forty-four cases, winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During May, 1885, there were thirty-three cold wave signals ordered, of which number twenty-five, or 75.76 per cent., were justified.

RAILWAY WEATHER SIGNALS.

The following extract is from the May report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr.:

The verification of prediction for the whole state was 98 per cent. for temperature and 97 per cent. for weather.

The following roads comprise this system: Western, of Alabama; Atlanta and West Point, of Georgia; South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia; Northeastern, of Georgia.

ATMOSPHERIC ELECTRICITY.

AURORAS.

The following reports of auroral displays have been recieved. It will be seen that the display on the night of the 11–12th, which was observed from central Montana to the New England coast, was most extensively reported. The display of the 13th was reported as exceptionally brilliant at Eastport, Maine:

4th.—Allison, Kansas, from 8 to 11.30 p. m.

6th.—Manchester, Iowa; Yutan, Nebraska.

7th.—Yutan, Nebraska.

8th.—Winnipeg, Manitoba; Yutan, Nebraska.

9th.—Fort Totten, Dakota: an auroral arch, with dark segment beneath, was observed from 10.30 to 12 p. m., altitude 15°. The display of the 9th was also observed at Webster, Dakota; Winnipeg, Manitoba; Vevay, Indiana, and Portsmouth, Ohio.

11th.—Bismarck, Dakota: a pale yellow auroral light in the northwestern sky, extending from the horizon to an altitude of 30°, was observed from 11 to 12 p. m.

11th.—Fort Bennett, Dakota: a faint aurora was observed from 12 p. m. to 1 a. m. of the 12th; it consisted of columns of pale light, varying in altitude from 9° to 15°; the display extended over 20° of the horizon; no arch was visible.

11th.—Moorhead, Minnesota: a faint aurora was observed in the north at 10.30 p. m.; no streamers were visible; the display continued until past midnight.

11th.—Duluth, Minnesota: a pale green auroral light was visible in the north from 8.25 p. m. until the morning of the 12th.

11th.—Escanaba, Michigan: a light yellow auroral light was visible from 10.08 p. m. until midnight.

11th.—Manistique, Michigan: from 9 p. m. to 2 a. m. of 12th.

11th.—Alpena, Michigan: an aurora appeared at 10.40 p. m. consisting of a diffuse light in the northwestern sky; no streamers were visible; the display ended at 1.40 a. m. on the 12th.

11th.—Oswego, New York: a faint auroral arch was visible from 11 p. m. until the morning of the 12th.

11th.—Cambridge, Massachusetts: an auroral arch was visible at 8.45 p. m.

11th.—Contoocook, New Hampshire: diffuse aurora at 9 p. m.

11th.—Portland, Maine: an auroral arch was observed from 9.45 p. m. until 1.33 a. m. on the 12th; it was of irregular form and extended over 90° of the horizon.

11th.—Gardiner, Maine: a faint aurora was observed at 9 p. m.; the display gradually grew brighter, and at 1 a. m. of the 12th was very brilliant, with flashing beams.

11th.—New Haven, Connecticut: aurora from midnight until 1.15 a. m. of 12th; there were no marked features.

11th.—Winnipeg, Manitoba; Boyne, Michigan; Le Roy, New York; Somerset, Massachusetts and Charlottetown, Prince Edward's Island.

12th.—Cornish, Maine: aurora at 2 a. m., the light extending to an altitude of 15°.

13th.—Manistique, Michigan: aurora from 8 to 11 p. m.

13th.—Northport, Michigan: a dim auroral light with a few beams extending to an altitude of 45° was observed at 9 p. m.

13th.—Alpena, Michigan: an aurora was first noticed at 8.15 p. m.; it consisted of an arch of pale green color from which beams, with an apparent motion from east to west, extending upward, some reaching an altitude of 30°.

13th.—Birmingham, Michigan: at aurora was observed at 9 p. m.

13th.—Ann Arbor, Michigan: an aurora appeared at 8 p. m., with streamers reaching nearly to the zenith.

13th.—Grampian Hills, Pennsylvania: a brilliant aurora was visible from 8.50 to 10 p. m., when the display became obscured by clouds.

13th.—North Volney, New York: faint aurora in the north at 8.45 p. m.

13th.—Mount Washington, New Hampshire: an aurora was observed from 9.20 to 11.10 p. m.; it consisted of waves of bluish light extending from the northern horizon to the zenith.

13th.—Bangor, Maine: "brilliant auroral light flashing beyond the zenith."

13th.—Orono, Maine: at 9 p. m. auroral streamers extended from all parts of the horizon to the zenith.

13th.—Eastport, Maine: an auroral display of unusual brilliancy was observed from 8 to 10.30 p. m.; from 9.20 to 9.45 "merry dancers" of pale yellow color appeared, having a motion from west to east; incomplete arches and nebulous masses were seen at all points between the altitudes of 30° and 45° and moved toward the zenith; dark segments also appeared on both the northern and the southern horizon. The effect of the aurora on the telegraph line between this place and Saint John, New Brunswick, was perceptible, although the current was not sufficiently strong to permit the transmission of signals.

The display of the 13th was also observed at the following places: Winnipeg, Manitoba; Westerville, Ohio; Franklin, Pennsylvania; Montreal, Quebec; Rowe, Massachusetts; Newport, Vermont; Charlottetown, Prince Edward's Island; Halifax and Sidney, Nova Scotia.

16th.—Cambridge, Massachusetts: a whitish band, apparently an auroral light, was observed in the north at 12.20 a. m.

18th.—Winnipeg, Manitoba.

25th.—Madison, Wisconsin: an aurora in the form of a bright arch, with streamers extending to an altitude of 45°, was observed at 12 p. m.

25th.—Saint Paul, Minnesota: a faint auroral arch was observed in the north at 1.30 a. m., being about 12° in height at the centre and extending over 30° of the horizon. At 2 a. m. numerous beams of a variety of colors appeared between the northeast and northwest and extended to an altitude of 70°; the streamers appeared and disappeared in rapid succession until 2.05 a. m., when flashes of light were observed moving towards the zenith. The telegraph lines running between Saint Paul and points to the northwestward were so affected during the display as to seriously interrupt communication.

26th.—Bismarck, Dakota: an auroral display was observed from 3.05 a. m. until daylight; it consisted of a greenish-yellow light, extending to an altitude of 35°; occasional streamers were also seen.

26th.—Grand Haven, Michigan: an aurora was visible from 1.45 to 2.50 a. m.; the light extended to an altitude of 15° and covered 40° of the horizon.

Table of miscellaneous meteorological data for May, 1885—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths).							Temperature of the air (in degrees Fahrenheit).										Relative humidity.	Mean dew-point.	Precipitation.		Winds.				Number of days.		
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly mean.	Departure from normal.	Extremes.					Daily ranges.									Max. velocity.				
					Highest barometer	Date.	Lowest barometer	Date.	Monthly range of barometer.		Max.	Date.	Mean max	Min.	Date.	Mean min	Monthly range.	Greatest.	Date.	Least.	Date.				Departure from normal	Total movement.	Prevailing direction.	Miles p.hr	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
New England.																															
Eastport	61	29.91	.00	29.98	30.33	16	29.19	2 1.14	47.5	+0.2	72.6	29	54.9	30.6	4	40.1	42.0	29.3	29	7.2	2	74.3	30.0	4.79	+0.27	5,242	s.	41	e.	2	11	5	14	12
Portland	45	29.94	+.01	29.98	30.34	16	29.52	2 0.82	54.8	0.0	81.6	27	64.2	35.4	2	47.1	46.2	26.9	15	4.4	6	69.3	44.2	1.91	−1.34	4,675	s.	34	n.	2	11	6	13	12
Mount Washington	6,279	23.77	.....	29.95	30.30	21	29.37	3 0.94	30.1	+2.6	61.9	24	44.1	− 1.4	3	29.1	63.3	20.9	1	7.0	7	80.4	29.9	2.29	−4.56	18,040	nw.	98	nw.	2	14	6	12	13
Boston	122	29.86	.00	29.99	30.34	21	29.53	2 0.80	52.3	−4.0	84.4	19	60.7	35.3	3	45.7	49.1	35.6	19	3.0	14	71	44.2	4.26	+0.79	7,811	e.	44	n.	14	12	10	10	11
Point Judith	.....	.....	.....	.....	.....	.....	.....	.....	50.8	.....	65.5	27	56.4	33.2	3	45.1	32.3	.....	...	.....	...	.....	.....	3.43	−0.11	.....	.....	...	.....	...	...	...	...	...
Block Island	27	29.95	.....	29.97	30.30	21	29.49	2 0.81	50.7	−1.2	75.8	27	56.5	37.9	2	45.5	37.9	20.4	26	4.6	14	85.2	46.2	4.14	−0.94	6,957	ne.	52	ne.	14	18	11	12	8
Narragansett Pier	.....	.....	.....	.....	.....	.....	.....	.....	52.4	.....	83.0	20	60.8	32.0	4	44.0	51.0	.....	...	.....	...	.....	.....	3.49	+0.11	.....	.....	...	.....	...	13	...	...	...
New London	47	29.95	.00	29.99	30.31	22	29.55	2 0.76	54.5	−1.9	80.3	26	62.0	35.3	4	47.1	45.0	28.0	19	3.5	8	70.8	44.2	5.02	+1.56	5,702	se.	32	se.	16	12	10	11	10
New Haven	107	29.88	.....	29.98	30.30	21	29.59	2 0.71	54.9	−3.2	82.2	19	64.1	31.3	4	46.2	50.9	29.2	15	7.8	8	69.0	43.7	2.61	−1.07	5,236	ne.	29	ne.	2	11	8	16	7
Middle Atlantic states.																															
Albany	75	29.90	−.01	29.98	30.26	22	29.60	9 0.67	57.2	−2.0	86.1	19	67.8	31.6	6	46.7	54.5	34.0	15	10.3	31	60.3	42.0	1.92	−1.04	4,536	sw.	24	s.	6	8	9	13	9
New York City	164	29.81	−.03	29.97	30.27	21	29.60	2 0.68	56.2	−2.9	84.8	15	64.7	39.0	5	48.8	45.8	31.1	15	7.1	8	73.7	47.0	2.22	−0.64	7,335	ne.	32	ne.	1	11	12	12	7
Sandy Hook	28	29.96	−.02	29.98	30.28	21	29.61	1 0.67	54.6	−4.2	83.1	20	62.6	41.1	5	48.9	42.0	31.5	15	4.1	8	70.8	46.6	2.67	−1.42	9,975	e.	50	e.	1	18	7	18	6
Barnegat City	22	29.95	−.04	29.96	30.24	21	29.53	1 0.71	54.6	−2.4	75.2	26	61.1	39.1	3	48.4	36.1	25.4	15	5.3	21	85.0	49.8	1.47	−1.17	9,046	ne.	36	n.	7	15	7	16	8
Little Egg Harbor	.....	.....	.....	.....	.....	.....	.....	.....	55.1	.....	77.2	26	61.0	38.8	3	49.2	38.4	.....	...	.....	...	.....	.....	2.39	−0.09	.....	.....	...	.....	...	13	...	...	...
Atlantic City	13	29.93	−.07	29.93	30.22	21	29.52	1 0.70	54.8	−2.5	75.0	26	61.5	35.4	3	49.3	39.6	25.5	15	3.8	29	89.9	51.6	3.61	+1.33	7,039	ne.	31	e.	7	15	7	20	4
Cape May	27	29.92	.....	29.93	30.18	21	29.52	1 0.66	57.4	−1.4	76.8	26	63.6	43.1	3	52.0	33.7	21.1	15	5.7	6	83.9	52.5	5.20	+2.69	9,165	e.	32	nw.	2	14	7	18	6
Philadelphia	117	29.84	−.06	29.95	30.30	21	29.57	1 0.73	59.6	−2.5	84.3	19	69.0	41.0	3	51.2	43.3	30.6	0	10.4	13	70.0	48.6	3.76	+0.93	6,452	ne.	29	nw.	2	15	8	20	3
Baltimore	45	29.92	−.06	29.95	30.19	21	29.53	1 0.66	63.0	−1.6	82.1	20	71.2	44.0	12	55.8	38.1	27.0	5	4.9	13	64.8	49.4	4.50	+1.66	3,917	se.	19	w.	4	12	17	10	4
Washington City	100	29.86	−.05	29.90	30.19	21	29.51	1 0.69	62.3	−2.1	86.4	19	71.2	40.5	12	53.5	45.9	33.2	5	5.6	22	68.1	50.0	2.85	−0.14	4,082	e.	21	nw.	2	12	12	14	5
Ocean City	.....	.....	.....	.....	.....	.....	.....	.....	58.3	.....	75.9	20	65.3	39.3	3	51.2	36.6	.....	...	.....	...	.....	.....	5.82	+1.98	.....	.....	...	.....	...	18	...	...	...
Chincoteague	8	29.94	−.07	29.93	30.20	12	29.50	1 0.70	59.9	−0.3	81.2	26	67.2	40.8	3	52.2	40.4	26.9	15	4.9	24	83.1	54.1	7.22	+5.25	6,801	ne.	44	nw.	13	19	12	16	3
Cape Henry	16	29.93	−.08	29.93	30.20	12	29.51	1 0.69	62.3	−1.9	83.6	31	70.1	46.8	11	56.5	36.8	27.7	5	4.0	17	81.9	56.3	4.93	+1.74	8,632	ne.	41	ne.	13	18	9	14	6
Norfolk	30	29.91	−.09	29.92	30.16	12	29.53	1 0.64	65.1	−1.6	84.4	31	73.0	46.8	12	58.3	37.6	20.8	5	4.1	17	79.4	58.1	6.16	+2.79	4,355	n.	18	n.	13	20	13	13	5
Lynchburg	652	29.26	−.07	29.92	30.15	15	29.48	1 0.67	63.4	−3.2	85.5	25	73.2	39.6	11	54.9	45.9	37.6	5	5.6	24	70.0	51.7	5.36	+2.48	2,441	ne.	16	nw.	2	14	15	5	11
South Atlantic states.																															
Kitty Hawk	22	29.95	−.10	29.94	30.20	12	29.49	1 0.71	63.6	−0.3	86.6	26	71.1	46.1	3	57.5	40.5	29.2	5	5.3	10	87.9	59.7	6.76	+3.84	8,667	n.	46	n.	13	16	11	15	5
Hatteras	12	29.91	−.10	29.93	30.17	12	29.55	1 0.62	66.3	+0.3	79.5	27	71.7	50.6	11	61.4	28.9	16.1	15	6.0	6	87.3	62.1	7.04	+3.15	7,381	ne.	29	w.	2	17	8	14	9
Fort Macon	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	...	...
New River Inlet	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	...	...
Wilmington	52	29.90	−.09	29.93	30.15	15	29.58	1 0.57	70.1	+0.4	87.9	25	79.0	51.3	11	62.6	36.6	22.8	8	9.4	6	76.0	61.4	8.58	+4.45	4,717	sw.	24	nw.	7	14	7	20	4
Smithville	34	29.93	−.09	30.94	30.17	15	29.60	1 0.57	69.2	−0.4	83.4	20	70.2	48.9	3	61.6	34.5	23.2	16	8.6	27	82.3	63.3	6.10	+3.39	7,428	sw.	33	s.	5	10	5	15	11
Charlotte	808	29.12	−.06	29.93	30.19	15	29.53	1 0.66	67.4	−1.6	87.0	25	76.8	45.2	11	58.3	41.8	20.9	18	10.8	27	65.1	53.6	6.47	+3.07	3,509	sw.	22	nw.	1	14	12	10	9
Atlanta	1,129	29.81	−.07	29.95	30.16	15	29.60	6 0.56	66.1	−3.2	83.0	20	74.8	46.0	10	58.9	37.0	22.5	11	7.0	27	68.8	53.7	6.12	+3.40	6,288	nw.	31	e.	15	15	9	12	10
Augusta	183	29.80	−.06	29.95	30.18	15	29.64	1 0.54	70.0	−2.0	91.9	20	83.0	47.0	11	60.4	44.9	32.0	18	10.8	12	70.1	58.1	5.86	+2.72	2,589	w.	26	n.	16	11	7	15	9
Charleston	52	29.92	−.07	29.94	30.14	15	29.63	7 0.51	72.3	0.0	90.2	29	79.9	54.0	10	66.2	30.2	20.8	13	7.0	12	72.3	62.4	2.20	−2.32	5,151	sw.	22	e.	16	10	7	13	11
Savannah	87	29.88	−.08	29.94	30.15	15	29.67	6 0.48	73.3	−0.3	90.0	29	80.8	54.5	11	66.0	30.1	21.6	10	7.2	12	67.8	61.0	3.98	+1.10	5,295	s.	20	s.	1	13	5	13	13
Jacksonville	43	29.93	−.06	29.94	30.10	25	29.68	6 0.42	73.7	−1.7	89.4	28	83.1	54.8	11	66.6	34.6	23.0	8	6.4	12	77.0	65.3	7.74	+3.82	4,693	se.	36	w.	23	14	9	14	8
Wash Woods	.....	.....	.....	.....	.....	.....	.....	.....	63.2	.....	86.0	26	71.2	42.0	2	55.3	44.0	.....	...	.....	...	.....	.....	4.47	.....	.....	.....	...	.....	...	18	...	...	...
Scott's Hill	.....	.....	.....	.....	.....	.....	.....	.....	60.8	.....	89.0	21	79.4	44.0	3	54.1	45.0	.....	...	.....	...	.....	.....	7.35	.....	.....	.....	...	.....	...	12	...	...	...
Cape Lookout	.....	.....	.....	.....	.....	.....	.....	.....	68.0	.....	84.9	27	76.6	49.0	14	60.6	35.9	.....	...	.....	...	.....	.....	7.37	+2.23	.....	.....	...	.....	...	13	...	...	...
Portsmouth	.....	.....	.....	.....	.....	.....	.....	.....	67.1	.....	79.8	20	72.0	50.9	14	62.3	28.9	.....	...	.....	...	.....	.....	.....	.....	.....	.....	...	.....	...	1	...	...	...
Florida peninsula.																															
Sanford	50	29.96	.....	29.99	30.17	25	29.77	6 0.39	73.9	−1.6	93.0	20	85.4	61.2	17	66.8	31.8	26.2	8	10.7	15	76.7	65.1	4.99	+2.97	3,921	ne.	27	n.	20	13	5	17	9
Cedar Keys	22	29.94	−.07	29.92	30.10	25	29.73	6 0.37	75.1	−0.9	80.8	29	81.6	59.8	11	69.8	27.0	22.5	17	5.3	5	74.2	65.5	3.48	+0.91	6,558	s.	20	se.	22	10	9	15	7
Key West	20	29.96	−.03	29.93	30.13	25	29.79	6 0.33	80.4	+0.4	90.8	24	86.3	70.4	16	75.6	20.4	14.5	25	5.4	11	70.3	72.0	2.48	−1.60	6,045	se.	30	ne.	14	12	9	17	5
Eastern Gulf states.																															
Montgomery	219	29.74	−.06	29.94	30.14	16	29.59	6 0.55	70.1	−3.2	88.8	28	80.4	48.1	11	61.2	40.7	29.3	17	8.0	19	70.6	58.7	8.92	+5.21	3,543	nw.	23	nw.	29	13	12	9	10
Pensacola	30	29.93	−.06	29.92	30.08	25	29.63	6 0.45	72.8	−1.1	86.2	28	80.5	60.8	20	66.7	25.4	21.3	10	7.8	27	73.4	63.0	1.42	−3.55	5,928	s.	28	ne.	18	6	6	20	5
Mobile	35	29.93	−.03	29.93	30.09	16	29.64	6 0.45	71.7	−2.7	86.4	31	80.1	52.6	10	64.1	33.8	24.6	8	7.1	27	72.9	61.5	3.27	−1.69	4,902	s.	32	ne.	18	11	4	22	5
Vicksburg	209	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	...	...
New Orleans	52	29.89	−.05	29.91	30.08	3	29.62	20 0.46	73.9	−1.3	87.0	28	80.3	60.5	9	68.4	26.5	15.0	25	7.6	1	72.8	63.8	5.77	+0.25	4,538	se.	28	ne.	18	15	7	17	7
Western Gulf states.																															
Fort Smith	470	29.45	−.01	29.91	30.21	8	29.55	6 0.66	65.6	−2.4	86.3	22	76.5	41.5	10	56.6	44.8	27.2	22	9.6	26	79.3	58.3	2.59	−2.09	2,828	e.	24	n.	24	11	9	14	8
Little Rock	298	29.62	−.04	29.89	30.16	8	29.50	6 0.66	68.1	−1.9	89.2	23	78.0	44.7	9	59.9	44.5	20.4	9	4.2	6	70.9	57.3	3.16	−3.81	3,153	e.	18	w.	29	10	7	14	10
Shreveport	227	29.71	−.03	29.91	30.13	2	29.58	6 0.55	71.2	−2.4	92.0	23	83.1	52.3	11	62.3	39.7	28.9	11	7.5	20	66.2	57.8	3.66	−1.57	4,035	s.	20	w.	28	9	0	14	11
Palestine	533	29.41	−.03	29.93	30.15	2	29.66	6 0.49	69.4	−1.2	87.4	27	79.5	51.4	11	61.2	36.0	24.7	7	12.4	30	77.2	61.2	6.08	−3.14	5,581	e.	48	w.	17	11	8	15	8
Indianola	26	29.89	−.03	29.88	30.07	2	29.61	6 0.46	75.0	−1.2	91.6	9	82.2	58.8	9	69.2	32.8	23.0	20	5.7	11	80.9	68.4	5.27	+1.91	9,934	e.	59	n.	8	9	3	25	3
Galveston	40	29.91	−.02	29.91	30.11	2	29.61	6 0.50	70.2	−0.2	87.7	30	81.4	58.0	9	70.6	29.7	17.0	8	5.8	26	76.5	67.9	6.41	+1.90	7,787	se.	37	ne.	20	10	0	19	0
San Antonio	.....	29.09	.....	29.85	30.06	2	29.57	5 0.49	70.7	−5.5	88.8	29	80.2	51.0	8	62.7	37.8	25.0	18	6.7	13	78.1	62.9	7.92	+4.67	5,532	ne.	40	s.	25	11	12	14	5
Rio Grande valley.																															
Rio Grande City	230	29.66	.00	29.84	30.04	2	29.62	6 0.42	75.6	−5.3	98.0	6	88.0	62.0	9	71.0	36.0	28.0	6	7.0	9	77.6	70.1	10.28	+7.53	5,067	se.	32	e.	8	13	9	16	6
Brownsville	57	29.83	−.04	29.84	30.00	2	29.62	19 0.38	70.8	−2.5	95.4	30	86.5	63.0	9	71.2	32.4	23.2	30	7.8	9	80.7	72.2	7.18	+4.15	5,526	se.	30	n.	18	11	13	15	3
Tennessee.																															
Nashville	549	29.37	−.05	29.93	30.14	15	29.47	6 0.67	65.2	−4.4	83.2	17	73.1	41.7	10	57.0	41.5	29.9	17	8.0	19	71.4	54.7	4.36	+0.83	4,224	e.	30	s.	23	12	8	15	7
Memphis	321	29.62	−.03	29.93	30.24	8	29.48	6 0.70	68.4	−2.4	90.2	24	77.6	41.5	8	57.0	48.8	29.8	15	10.0	7	64.8	54.8	3.05	−1.81	3,544	nw.	24	nw.	6	11	7	16	8
Chattanooga	783	29.15	−.07	29.94	30.18	16	29.53	6 0.65	65.6	−3.0	86.1	18	70.0	44.0	10	57.3	42.1	29.8	17	7.5	21	73.5	55.3	5.12	+1.57	3,794	nw.	22	nw.	1	16	7	11	13
Knoxville	980	28.95	−.07	29.94	30.20	16	29.52	6 0.67	63.8	−2.8	85.2	18	74.9	39.2	11	55.1	46.0	32.7	11	8.7	27	70.4	52.5	7.19	+3.94	3,694	n.	23	nw.	24	13	11	9	11
Ohio valley.																															
Pittsburg	766	29.12	−.07	29.92	30.21	16	29.51	6 0.70	62.3	+0.3	87.1	23	72.6	38.6	3	52.6	48.5	36.2	5	7.4	22	60.0	46.4	3.26	+0.51	4,071	e.	21	s.	5	15	9	16	6
Columbus	805	29.07	−.07	29.91	30.22	15	29.49	6 0.73	60.7	−2.5	80.1	17	71.4	35.1	10	51.0	51.0	33.7	17	7.7	9	75.6	52.3	5.83	+1.32	5,131	sw.	30	w.	7	14	8	16	7
Indianapolis	753	29.13	−.06	29.91	30.19	15	29.51	6 0.68	60.5	−3.3	87.7	24	71.4	35.3	8	51.1	52.4	35.2	20	7.0	6	60.2	47.7	3.60	−0.04	4,109	sw.	24	w.	24	10	7	17	7
Greencastle	.....	29.00	.....	29.92	30.19	15	29.50	6 0.69	60.2	.....	84.1	24	69.6	30.4	9	52.7	47.7	32.0	20	5.6	27	68.7	48.8	3.37	.....	5,253	sw.	27	sw.	8	12	5	19	7
Cincinnati	628	29.28	−.04	29.92	30.20	15	29.47	6 0.73	61.5	−4.1	84.1	24	71.7	37.0	8	52.4	47.1	32.4	17	7.4	27	65.1	48.1	3.07	−1.58	4,423	nw.	23	sw.	5	13	9	13	9
Louisville	530	29.37	−.05	29.93	30.20	15	29.48	6 0.72	65.2	−1.9	87.4	24	74.7	39.1	8	54.9	48.3	28.2	10	11.7	1	68.7	53.7	4.20	+0.27	5,339	w.	22	sw.	8	14	9	13	9
Lower lake region.																															
Detroit	661	29.22	−.06	29.91	30.21	15	29.50	6 0.70	56.8	−1.1	80.0	17	65.7	30.3	3	48.8	49.7	27.0	20	4.6	22	63.6	46.4	3.65	+0.02	6,723	s.	28	sw.	7	13	7	14	10
Toledo	651	29.24	−.04	29.92	30.21	15	29.51	6 0.70	57.9	−1.1	83.0	17	65.6	32.3	3	49.2	50.8	24.2	18	6.8	22	69.9	47.0	5.11	+2.51	6,220	sw.	32	w.	9	15	8	17	6
Sandusky	639	29.26	−.06	29.92	30.22	15	29.51	6 0.71	56.7	−1.3	85.1	18	65.4	34.9	11	49.0	50.2	27.9	16	4.9	1	68.7	45.3	4.35	−0.95	8,398	e.	38	sw.	9	12	10	14	7
Cleveland	690	29.21	−.05	29.93	30.24	15	29.50	6 0.74	55.6	−2.6	80.6	17	64.8	33.2	3	48.2	47.4	28.4	6	5.1	10	75.8	47.5	3.88	+0.68	6,455	ne.	30	w.	7	13	5	15	11
Erie	681	29.21	−.05	29.92	30.20	10	29.52	6 0.67	56.1	−1.5	80.8	18	64.3	30.6	3	47.8	50.2	24.8	24	9.2	4	72.9	47.1	4.90	+1.35	6,827	w.	27	s.	7	13	9	10	12
Buffalo	690	29.20	−.04	29.93	30.21	16	29.50	7 0.72	53.1	−0.6	81.0	17	61.7	30.3	3	46.0	50.7	28.5	20	4.4	10	81.2	47.1	3.80	+0.81	6,216	sw.	32	sw.	10	17	10	15	6
Rochester	621	29.28	−.04	29.93	30.20	16	29.59	31 0.62	55.4	−1.0	85.3	25	66.9	31.3	3	46.9	54.0	30.7	15	9.3	13	75.7	47.3	2.02	−1.21	6,937	w.	34	s.	7	13	10	15	6
Oswego	334	29.59	−.04	29.95	30.21	16	29.59	31 0.61	52.5	−2.1	81.4	17	60.5	27.0	3	43.3	53.8	32.6	25	7.5	11	70.6	42.4	3.37	+0.59	6,795	se.	26	se.	7	12	9	14	8
Upper lake region.																															
Duluth	644	29.18	−.06	29.92	30.24	2	29.46	8 0.78	47.0	−1.8	77.9	25	56.1	26.6	7	38.7	51.3	34.3	16	5.9	18	60.9	32.7	1.53	−2.50	5,158	e.	29	ne.	27	9	10	10	11
Marquette	673	29.16	−.08	29.90	30.25	27	29.27	8 0.98	45.4	−4.0	81.2	24	54.1	27.0	6	37.4	54.2	30.2	17	3.5	5	71.8	35.5	3.19	+0.21	5,349	nw.	29	w.	7	10	7	9	15
Escanaba	613	29.21	−.09	29.87	30.18	27	29.34	8 0.85	47.6	−1.8	76.2	25	56.4	27.1	2	39.4	49.1	28.7	20	6.7	18	66.5	36.2	3.61	−0.32	7,023	s.	35	n.	18	14	7	14	10
Milwaukee	697	29.16	−.06	29.90	30.16	2	29.46	6 0.70	49.7	−3.8	80.4	16	59.9	27.5	7	42.4	52.9	25.2	16	4.2	19	70.0	39.4	0.41	−3.24	8,999	n.	40	sw.	7	8	8	12	11
Chicago	661	29.21	−.05	29.90	30.15	15	29.51	5 0.64	52.8	−4.1	80.4	24	60.6	33.8	7	46.1	46.6	28.9	24	3.1	19	70.9	42.9	3.17	−0.69	5,466	n.	30	sw.	8	11	7	13	11
Grand Haven	620	29.25	−.06	29.91	30.19	15	29.53	5 0.66	52.9	−2.5	76.6	17	62.3	32.3	11	45.1	43.3	25.8	14	6.5	8	70.7	42.9	1.17	−2.43	7,534	s.	37	w.	7	8	4	15	11
Mackinaw City	605	29.24	−.04	29.90	30.22	28	29.43	7 0.79	44.4	−1.8	80.7	16	53.4	27.0	3	39.4	53.7	39.6	16	5.5	5	74.0	36.0	2.53	−0.55	5,710	e.	37	sw.	7	8	8	11	12
Alpena	609	29.24	−.08	29.90	30.20	28	29.44	7 0.76	46.5	−2.4	78.3	16	56.3	25.1	3	50.1	53.2	33.3	16	4.2	8	71.4	40.5	2.18	−1.76	6,618	se.	30	sw.	7	10	9	9	13
Port Huron	633	29.24	−.06	29.91	30.17	15	29.55	9 0.62	50.0	−3.3	81.3	17	59.7	26.3	3	42.4	55.0	36.2	18	6.9	9	77.1	42.3	3.80

Table of miscellaneous meteorological data for May, 1885—Signal Service observations—Continued.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths).								Temperature of the air (in degrees Fahrenheit).														Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal	Winds.				No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.						Monthly range.	Daily ranges.									Total movement.	Prevailing direction.	Max. velocity.					
					Highest barometer	Date.	Lowest barometer	Date.				Max.	Date.	Mean max	Min.	Date.	Mean min		Greatest.	Date.	Least.	Date.							Miles p.hr	Direction.	Date.				
Extreme northwest.																																		
Fort Buford	1,930	27.88	—.06	29.89	30.28	9	29.58	20	0.70	54.2	+ 0.4	84.1	13	70.2	20.0	8	41.6	64.1	43.2	12	16.5	6	59.1	37.8	1.02	—1.13	7,150	nw.	32	nw.	5	8	10	15	6
Bismarck	1,694	28.11	.00	29.90	30.25	9	29.54	15	0.71	54.0	— 0.9	83.0	22	66.7	21.6	6	43.1	61.4	34.5	13	11.6	15	74.5	45.1	0.92	—2.31	6,522	n.	38	s.	15	10	6	17	8
Fort Totten	.....	28.30	.....	29.90	30.23	1	29.54	15	0.69	50.8	.....	86.2	22	64.4	30.5	6	40.5	65.7	36.1	13	9.3	6	68.3	39.5	1.70	.....	9,679	n.	41	nw.	8	10	8	12	11
Moorhead	923	28.90	—.06	29.88	30.22	1	29.44	15	0.78	52.6	— 0.7	85.3	22	65.2	21.4	7	41.8	63.9	34.4	4	5.0	8	72.0	42.8	2.27	—1.09	8,440	n.	40	n.	7	6	8	16	7
Saint Vincent	804	29.06	—.04	29.94	30.30	1	29.60	15	0.70	50.6	— 0.6	84.9	22	62.5	21.0	6	40.4	62.9	34.0	13	8.0	6	76.3	42.7	1.59	—0.95	8,177	nw.	40	nw.	7	7	6	16	9
Upper Mississippi valley.																																		
Saint Paul	801	29.04	—.04	29.88	30.17	2	29.51	6	0.66	56.7	— 1.9	87.1	23	69.8	26.6	7	46.9	60.5	34.7	4	10.3	20	72.2	47.2	2.12	—1.48	5,606	s.	34	s.	15	9	7	18	6
La Crosse	725	29.13	—.03	29.89	30.18	2	29.49	6	0.69	57.8	— 2.7	85.7	24	66.9	29.5	7	49.1	56.2	27.2	4	5.8	8	59.9	42.7	2.52	—0.91	6,003	nw.	25	n.	5	7	5	13	12
Dubuque	665	29.21	.....	29.90	30.18	2	29.52	5	0.66	56.7	— 4.4	86.0	24	68.6	25.9	7	46.8	60.1	31.8	4	5.7	29	64.3	43.1	2.62	—1.39	4,205	nw.	24	w.	8	13	6	16	9
Davenport	615	29.27	—.03	29.91	30.20	2	29.53	5	0.66	57.8	— 3.8	84.7	24	68.4	29.3	7	48.6	55.4	31.0	13	7.7	17	65.4	44.7	1.94	—2.52	6,116	nw.	34	w.	8	6	8	17	6
Des Moines	849	29.03	—.03	29.91	30.22	2	29.56	5	0.66	59.1	— 2.1	91.6	23	71.9	27.8	7	48.8	63.8	37.0	4	5.3	28	68.4	47.7	1.70	—4.47	3,769	n.	25	nw.	8	9	6	17	8
Keokuk	618	29.27	—.02	29.91	30.17	2	29.56	5	0.61	60.6	— 2.8	83.7	24	70.3	32.2	7	51.1	51.5	27.6	4	5.5	28	69.0	49.6	2.59	—1.60	6,201	nw.	28	w.	8	8	4	17	10
Springfield	644	29.25	—.06	29.90	30.15	2	29.55	5	0.60	61.4	— 2.4	82.4	24	70	38.0	7	52.7	44.4	29.2	20	5.0	28	62.9	47.8	2.78	—3.14	6,375	nw.	29	w.	8	10	7	18	6
Saint Louis	583	29.34	—.03	29.92	30.16	2	29.55	6	0.61	64.9	— 1.1	91.0	24	73.4	40.5	7	57.5	50.5	27.5	20	6.4	6	66.6	52.6	2.80	—0.98	7,028	nw.	34	nw.	24	11	7	17	7
Cairo	377	29.58	—.04	29.93	30.15	8	29.53	6	0.62	65.6	— 2.4	89.3	24	74.1	40.2	8	58.3	49.1	22.9	15	9.0	12	67.7	53.5	3.21	—1.07	5,157	n.	26	s.	5	13	5	20	6
Missouri valley.																																		
Fort Bennett	1,510	28.35	.....	29.91	30.24	1	29.56	15	0.68	56.4	— 0.1	86.8	22	70.7	24.6	9	45.8	62.2	43.7	4	4.6	28	64.2	42.7	2.40	—0.22	7,435	n.	40	n.	4	10	7	15	9
Fort Sully	.....	.....	.....	.....	.....	...	.....	...	.....	59.8	.....	89.3	21	73.7	27.5	7	45.9	01.8	.....	...	.....	...	.....	.....	2.70	0.00	.....	.....	...	.....	...	12	..	...	...
Yankton	1,228	28.63	—.01	29.90	30.23	2	29.58	15	0.65	57.4	— 2.1	85.6	23	70.2	25.5	7	47.0	60.1	41.2	4	10.1	15	65.7	44.2	4.01	—0.57	6,869	n.	36	s.	15	10	6	14	11
Huron	1,305	28.54	—.01	29.89	30.23	2	29.56	15	0.67	55.1	+ 2.3	86.0	21	68.6	25.3	9	43.4	60.7	41.7	4	7.1	28	71.8	45.6	5.20	+1.25	8,031	n.	34	sw.	20	13	5	13	13
Omaha	1,113	28.79	+.01	29.93	30.20	2	29.00	5	0.66	59.8	— 2.6	86.5	31	69.9	28.7	7	50.8	57.8	28.9	4	6.5	10	67.2	47.9	4.43	—0.59	6,645	nw.	32	nw.	6	10	6	15	10
Leavenworth	842	29.07	+.01	29.93	30.25	2	29.62	5	0.63	61.8	— 3.0	88.0	31	72.5	36.5	8	52.7	51.5	31.2	10	7.0	16	70.1	51.0	5.89	+0.84	3,158	nw.	23	s.	15	13	4	13	14
Lamar	1,028	28.89	.....	29.94	30.23	8	29.59	6	0.64	62.0	.....	85.0	23	72.5	32.6	7	53.1	52.4	25.9	31	9.7	29	70.4	51.3	5.02	.....	6,256	se.	43	s.	17	13	12	12	7
Northern slope.																																		
Fort Assiniboine	2,710	.....	.....	.....	.....	...	.....	...	.....	.....	.....	.....	...	.....	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	...	...
Fort Benton	2,700	27.10	.....	29.95	30.32	7	29.62	13	0.70	57.0	+ 2.3	89.1	30	71.9	22.1	7	41.6	67.0	49.9	12	14.2	15	55.7	39.8	0.48	—2.35	5,117	sw.	43	ne.	13	8	4	20	6
Fort Shaw	3,550	26.29	.....	29.90	30.19	7	29.58	20	0.61	53.0	+ 3.1	85.2	30	67.7	22.5	7	39.2	62.7	45.7	12	12.0	15	57.1	37.3	0.82	—0.85	4,658	w.	36	ne.	13	10	5	9	17
Helena	4,044	25.78	—.03	29.90	30.13	8	29.59	20	0.54	51.0	— 0.6	79.3	30	63.0	21.9	7	40.8	57.4	33.2	12	11.7	15	55.5	34.4	0.85	—0.26	4,930	sw.	30	nw.	4	11	4	18	9
Fort Custer	3,040	26.79	+.01	29.89	30.22	8	29.53	13	0.69	55.2	+ 0.7	87.0	30	70.9	18.1	7	38.1	68.9	44.7	25	17.5	22	48.4	33.1	0.47	—2.74	5,536	nw.	39	nw.	5	6	6	20	5
Poplar River	2,030	27.78	.....	29.92	30.29	8	29.02	20	0.66	54.1	.....	86.6	31	69.6	22.0	8	38.9	64.0	47.9	17	14.4	6	73.4	44.6	0.77	—0.94	5,810	n.	34	nw.	16	9	2	12	17
Fort Maginnis	4,340	25.52	.....	29.93	30.22	8	29.64	13	0.58	49.8	.....	81.1	31	64.1	14.4	7	38.2	66.4	37.6	12	14.4	5	57.2	34.3	0.43	—0.81	7,266	n.	44	nw.	5	10	1	20	10
Deadwood	4,600	25.35	+.02	29.87	30.12	9	29.62	15	0.51	48.8	— 0.4	73.4	13	60.3	17.3	7	40.0	56.1	31.3	12	8.6	28	71.7	38.9	3.22	—2.22	2,822	ne.	20	sw.	14	14	3	15	13
Cheyenne	6,089	23.98	—.01	29.86	30.08	1	29.64	15	0.44	46.7	— 4.1	79.1	31	60.5	22.4	7	36.2	56.7	33.9	22	7.7	7	69.7	35.5	1.33	—1.00	6,899	nw.	36	nw.	15	11	7	10	14
North Platte	2,841	27.04	+.02	29.88	30.18	8	29.52	15	0.66	56.3	— 2.4	85.2	31	66.6	28.0	8	47.2	57.2	31.3	2	6.0	28	69.6	45.5	3.31	+0.22	6,909	nw.	40	se.	22	13	6	19	6
Middle slope.																																		
Denver	5,294	24.72	+.03	29.87	30.15	1	29.61	15	0.54	52.7	— 3.8	86.0	31	64.4	27.1	7	41.9	58.9	36.6	21	6.3	7	58.8	35.3	2.13	—1.04	5,007	n.	28	nw.	10	17	9	17	5
Pike's Peak	14,134	17.82	.....	29.87	30.09	30	29.66	15	0.42	21.1	— 0.8	38.7	31	26.6	9.7	17	16.8	29.0	14.6	29	4.0	22	88.4	18.3	6.12	+2.11	13,797	sw.	74	sw.	15	22	8	17	6
Dodge City	2,517	27.36	+.03	29.87	30.16	8	29.01	5	0.55	58.7	— 4.3	84.0	31	71.0	33.4	7	49.2	50.6	35.7	27	7.1	14	72.9	48.9	4.07	—0.28	8,799	se.	58	se.	15	19	6	18	7
West Las Animas	3,905	25.99	+.02	29.82	30.06	2	29.50	15	0.55	57.3	+ 0.1	95.2	31	72.8	33.4	8	44.8	61.8	43.2	30	9.9	10	66.8	44.4	0.49	—3.18	6,823	w.	32	s.	22	7	9	14	8
Fort Elliott	2,650	27.19	+.02	29.87	30.14	8	29.58	5	0.55	59.3	— 3.8	82.0	31	71.8	35.0	10	50.4	47.0	29.2	10	10.4	11	75.5	50.3	7.23	+1.61	8,695	s.	36	se.	15	10	7	15	9
Fort Reno	.....	.....	.....	.....	.....	...	.....	...	.....	64.1	.....	90.4	27	75.2	37.0	10	52.9	53.4	.....	...	.....	...	.....	.....	9.84	+5.22	.....	.....	...	.....	...	11	...	...	...
Concordia	.....	28.48	.....	.....	.....	...	.....	...	0.62	58.3	.....	84.1	23	70	31.0	8	49.0	53.1	31.6	10	9.9	16	77.2	50.2	2.63	.....	6,131	nw.	48	s.	15	13	4	16	11
Southern slope.																																		
Fort Sill	1,200	28.68	—.01	29.87	30.15	2	29.52	5	0.63	64.7	— 5.1	87.0	24	75.7	42.0	10	55.4	45.0	30.0	12	5.0	19	77.8	56.4	5.54	+0.51	6,728	n.	36	n	7	13	9	13	9
Fort Concho	1,900	28.02	+.01	29.89	30.17	8	29.55	19	0.62	67.6	— 5.1	92.2	21	81.3	43.6	8	57.3	48.6	35.5	31	12.4	4	77.2	59.3	2.80	—1.71	6,541	s.	35	nw.	24	6	9	14	8
Fort Stockton	3,010	26.91	+.01	29.89	30.18	8	29.64	19	0.52	68.6	— 3.5	99.0	27	85.9	40.0	8	56.5	59.0	40.8	20	14.0	9	73.3	58.3	2.44	+1.05	7,654	se.	40	se.	22	10	3	7	21
Fort Davis	4,928	25.12	.....	29.80	29.95	2	29.59	19	0.36	64.5	— 4.1	89.5	31	79.0	43.5	8	53.1	46.0	38.5	21	9.3	9	52.8	42.6	1.97	+0.43	5,012	sw.	27	ne.	1	12	5	7	19
Southern plateau.																																		
Fort Verde	.....	.....	.....	.....	.....	...	.....	...	.....	69.0	+ 0.6	99.0	30	85.5	41.0	15	52.5	58.0	.....	...	.....	...	.....	.....	0.19	—0.14	.....	.....	...	.....	...	3	...	...	...
Prescott	5,389	24.67	.00	29.79	29.93	28	29.61	18	0.31	59.0	+ 2.7	90.5	30	75.2	33.3	15	44.4	57.2	41.9	29	12.7	12	51.2	38.7	0.37	—0.20	5,169	s.	29	s.	14	4	0	11	20
Wickenburg	.....	.....	.....	.....	.....	...	.....	...	.....	70.8	+ 2.0	106.0	30	90.6	44.5	15	51.5	01.5	.....	...	.....	...	.....	.....	0.55	+0.29	.....	.....	...	.....	...	3	...	...	...
Phoenix	.....	.....	.....	.....	.....	...	.....	...	.....	68.9	— 5.9	113.0	30	96.9	34.7	27	44.0	78.0	.....	...	.....	...	.....	.....	0.65	+0.57	.....	.....	...	.....	...	1	...	...	...
Fort Grant	4,856	25.15	.....	29.73	29.81	24	29.56	18	0.25	65.5	— 1.1	94.1	30	80.4	48.1	5	54.9	46.0	31.4	30	16.6	3	34.4	34.3	0.25	—0.18	5,245	n.	42	s.	2	3	1	7	23
Fort Thomas	2,710	27.10	.....	29.74	29.86	2	29.59	18	0.27	69.2	+ 0.8	99.5	31	87.5	40.4	1	51.4	59.1	46.1	28	21.1	8	39.6	39.5	0.09	—0.30	.....	w.	...	.....	...	2	0	8	23
Fort Apache	5,050	24.97	+.01	29.77	29.88	28	29.01	18	0.26	58.7	+ 1.7	91.3	31	78.3	33.7	18	41.3	57.6	47.3	28	19.0	3	45.7	34.9	1.12	+0.54	5,081	ne.	31	se.	2	8	1	10	20
Lava	.....	.....	.....	.....	.....	...	.....	...	.....	63.9	.....	92.0	31	83.1	38.0	19	44.8	54.0	.....	...	.....	...	.....	.....	0.82	.....	.....	.....	...	.....	...	8	...	...	...
San Carlos	.....	.....	.....	.....	.....	...	.....	...	.....	70.9	.....	102.0	31	90.2	43.0	19	51.6	59.4	.....	...	.....	...	.....	.....	0.22	—0.30	.....	.....	...	.....	...	5	...	...	...
Fort Bowie	.....	.....	.....	.....	.....	...	.....	...	.....	69.4	.....	96.0	31	83.5	47.0	15	55.4	49.0	.....	...	.....	...	.....	.....	0.19	.....	.....	.....	...	.....	...	5	...	...	...
Willcox	.....	.....	.....	.....	.....	...	.....	...	.....	66.2	.....	100.0	31	86.9	34.5	17	45.5	66.0	.....	...	.....	...	.....	.....	trace	.....	.....	.....	...	.....	...	4	...	...	...
El Paso	3,764	26.17	+0.1	29.78	29.96	2	29.56	18	0.41	69.6	— 2.7	101.0	30	89.8	49.0	1	57.0	52.3	44.5	14	17.9	4	35.8	34.6	1.27	+0.95	3,861	w.	20	sw.	24	7	4	13	14
Santa Fé	.....	23.24	+.05	29.86	30.04	30	29.68	19	0.36	52.5	— 3.4	77.0	31	64.1	35.0	6	42.5	42.0	31.5	20	9.0	9	53.0	33.1	1.31	+0.46	5,048	sw.	22	sw.	23	10	4	19	8
Middle plateau.																																		
Salt Lake City	4,348	25.57	—.01	29.88	30.10	24	29.63	13	0.47	56.3	— 0.9	83.8	30	67.2	35.9	16	46.1	47.9	31.2	30	10.2	22	63.7	43.4	2.49	+0.35	2,659	nw.	28	se.	12	16	4	17	10
Fort Bidwell	.....	.....	.....	.....	.....	...	.....	...	.....	.....	.....	.....	...	.....	.....	...	.....	.....	.....	...	.....	...	.....	.....	.....	.....	.....	.....	...	.....	...	.....	...	...	...
Fort Bridger	.....	.....	.....	.....	.....	...	.....	...	.....	46.7	.....	79.0	30	60.7	23.4	26	32.6	55.6	.....	...	.....	...	.....	.....	1.66	.....	.....	.....	...	.....	...	24	...	...	...
Winnemucca	.....	25.57	+.01	29.90	30.10	28	29.04	12	0.45	55.3	+ 2.2	86.4	29	69.4	20.0	23	41.4	60.4	36.7	6	12.4	13	48.3	33.5	1.02	+0.11	4,866	sw.	40	w.	30	5	3	15	13
Montrose	.....	24.24	.....	29.87	30.05	2	29.72	7	0.33	53.7	.....	84.2	31	69.4	33.8	19	42.4	50.4	39.2	25	14.7	10	51.5	32.7	0.86	.....	6,243	se.	36	sw.	12	7	4	15	12
Northern plateau.																																		
Dayton	1,667	28.19	.....	29.95	30.22	9	29.63	11	0.59	57.3	+ 1.4	86.6	5	71.1	34.0	9	45.9	52.6	40.2	10	6.0	14	63.3	43.2	3.08	+1.31	4,600	sw.	24	sw.	19	9	6	16	9
Lewiston	780	29.11	.....	29.90	30.17	9	29.50	12	0.68	60.4	+ 1.8	86.8	2	73.3	42.1	9	49.4	44.7	37.0	11	7.6	20	61.6	45.7	3.02	+2.02	973	ne.	22	ne.	5	11	7	12	12
Spokane Falls	1,910?	27.91	—.04	29.97	30.28	9	29.55	12	0.72	57.2	+ 1.5	82.0	29	68.3	35.1	8	46.0	46.9	36.4	2	6.7	14	68.5	45.8	1.53	+0.35	4,392	sw.	33	w.	19	11	10	14	7
Coeur d'Alene	.....	.....	.....	.....	.....	...	.....	...	.....	54.3	.....	86.0	18	68.3	29.0	9	40.5	57.0	.....	...	.....	...	.....	.....	2.57	+0.79	.....	.....	...	.....	...	11	...	...	...
Boisé City	2,750	27.11	.....	29.95	30.18	27	29.54	12	0.63	58.9	+ 2.1	86.8	30	70.9	37.2	23	48.2	49.6	33.0	11	9.0	19	63.0	45.0	3.14	+1.36	3,230	nw.	24	nw.	4	11	4	13	14
Ashland	.....	.....	.....	.....	.....	...	.....	...	.....	59.8	.....	93.0	5	75.8	32.0	23	43.8	61.0	.....	...	.....	...	.....	.....	3.74	.....	.....	.....	...	.....	...	9	...	...	...
North Pacific coast region																																		
Astoria	.....	.....	.....	.....	.....	...	.....	...	.....	54.6	.....	75.0	10	61.2	42.0	21	48.0	33.0	.....	...	.....	...	.....	.....	3.43	.....	.....	.....	...	.....	...	15	...	...	...
Olympia	36	29.93	—.09	29.97	30.22	27	29.73	19	0.49	55.5	+ 2.3	87.7	5	68.7	36.0	22	44.2	51.7	43.0	2	13.1	11	72.9	46.5	2.84	+0.26	1,979	s.	14	s.	13	15	8	9	17
Portland	67	29.90	—.08	29.98	30.26	27	29.74	12	0.50	56.9	+ 2.7	94.0	5	74.5	40.3	2	48.9	53.7	43.7	2	13.8	13	68.1	47.1	4.69	+2.34	2,701	nw.	15	sw.	19	13	15	8	8
Roseburg	523	29.44	—.04	30.00	30.22	27	29.77	10	0.45	58.3	+ 2.7	85.7	5	71.6	39.0	22	47.2	49.7	40.7	1	8.5	12	68.3	46.5	2.91	+1.14	2,160	n.	16	sw.	20	12	12	8	11
Fort Canby	179	29.80	.....	30.00	30.23	27	29.73	19	0.50	52.6	.....	75.4	10	57.8	43.6	20	48.5	31.8	26.7	10	3.2	13	87.3	48.7	3.45	.....	5,712	w.	35	s.	25	14	18	13	0
Port Angeles	14	29.94	.....	29.96	30.19	9	29.68	19	0.52	50.4	.....	71.9	5	58.4	34.7	23	43.1	37.2	31.4	5	6.1	14	88.2	47.0	1.47	.....	4,142	nw.	23	nw.	30	9	12	10	9
Neah Bay	.....	.....	.....	.....	.....	...	.....	...	.....	.....	.....	68.0	5	.....	37.0	23	...	31.0	.....	...	.....	...	.....	.....	5.70	.....	.....	.....	...	.....	...	12	...	...	...
Tatoosh Island	.....	29.88	.....	29.98	30.20	9	29.67	19	0.53	51.2	.....	59.8	5	55.6	42.3	20	47.7	17.5	15.0	5	3.4	28	89.2	48.0	5.46	.....	6,712	sw.	44	e.	5	15	13	16	2
Pysht	.....	.....	.....	.....	.....	...	.....	...	.....	54.2	.....	82.0	5	64.5	36.0	23	44.0	46.0	.....	...	.....	...	.....	.....	2.63	.....	.....	.....	...	.....	...	15	...	...	...
Mid. Pacific coast region																																		
Cape Mendocino	637	29.32	.....	29.99	30.18	22	29.85	11	0.34	51.5	+ 0.4	66.0	4	57.7	42.2	4	46.6	23.8	23.8	4	6.6	8	84.8	46.9	0.62	—0.38	13,003	n.	42	se.	5	2	4	22	5
Red Bluff	332	29.55	—.05	29.88	30.10	22	29.62	31	0.47	70.4	+ 4.1	100.0	29	82.8	44.0	14	56.2	56.0	34.5	29	15.5	19	45.1	45.1	0.64	—0.56	4,599	s.	24	nw.	21	2	1	8	22
Sacramento	65	29.84	—.05	29.89	30.04	14	29.69	31	0.35	65.7	+ 2.5	98.0	29	79.8	49.5	13	54.8	48.5	33.0	27	15.0	12	58.6	49.5	trace	—0.78	6,289	sw.	30	nw.	22	0	0	5	26
San Francisco	60	29.90	—.04	29.95	30.09	1	29.81	12	0.28	57.2	+ 1.0	77.0	29	63.5	50.0	3	52.7	27.0	21.5	27	6.0	12	78.4	50.1	0.04	—0.64	8,963	w.	32	w.	2	1	6	13	12
South Pacific coast region																																		
Los Angeles	371	29.56	—.04	29.91	30.02	13	29.79	6	0.24	63.5	+ 1.7	80.0	27	76.5	48.6	16	54.7	31.4	27.9	22	15.4	12	75.3	54.7	0.06	—0.51	3,189	w.	23	w.	14	1	6	21	4
San Diego	67	29.86	—.04	29.90	30.02	13	29.78	11	0.24	63.3	+ 2.3	73.4	7	70.0	52.5	24	58.2	20.9	20.0	24	7.2	2	77.4	55.8	0.61	+0.20	3,993	w.	15	w.	12	4	10	18	3
Yuma	141	29.63	—.04	29.75	29.88	1	29.59	18	0.29	78.2	+ 1.2	110.0	30	94.8	57.4	16	63.1	52.6	40.1	30	22.4	13	48.8	54.5	trace	—0.06	4,394	sw.	22	sw.	4	0	0	9	22

27th.—Escanaba, Michigan: an auroral display was visible from 9.20 to 11.47 p. m.; numerous beams covered the northern sky, and appeared and disappeared in quick succession.

27th.—Alpena, Michigan: an aurora appeared at 9.40 p. m., consisting of a faint arch, extending to an altitude of 40°; at 10 p. m. numerous slender beams shot upward, rising and falling in quick succession with an apparent motion from east to west; the display ended at 11.30 p. m.

27th.—Portland, Maine: an aurora was observed from 10.25 to 11.50 p. m.; owing to the bright moonlight the display was scarcely perceptible.

27th.—Eastport, Maine: an aurora was visible from 10.20 p. m. until the early a. m. of the 28th. A bank of haze extended along the horizon from east to west and from it streamers shot upward to beyond the zenith, assuming the form of "merry dancers." The light from the full moon diminished the brilliancy of the display.

The display of the 27th was also observed at Montreal, Quebec, and Halifax, Nova Scotia.

31st.—Madison, Wisconsin: auroral streamers were observed during the evening.

THUNDER-STORMS.

Thunder-storms occurred in the various districts during the month as follows:

New England.—3d, 4th, 9th, 10th, 12th, 19th, 27th, 31st.

Middle Atlantic states.—1st, 2d, 4th, 5th, 6th, 9th, 16th, 21st to 27th, 29th, 30th, 31st.

South Atlantic states.—1st, 2d, 5th, 6th, 7th, 9th, 12th to 17th, 20th to 31st.

Florida peninsula.—4th to 7th, 9th, 11th to 31st.

Eastern Gulf states.—6th, 14th, 15th, 20th to 30th.

Western Gulf states.—1st to 8th, 13th to 21st, 24th to 29th.

Rio Grande valley.—1st, 2d, 4th, 5th, 7th, 8th, 11th, 14th to 17th, 20th, 25th, 29th, 30th.

Tennessee.—1st, 6th, 19th, 21st to 30th.

Ohio valley.—1st, 5th to 11th, 13th, 17th to 2[illegible]th, 28th to 31st.

Lower lake region.—4th to 7th, 13th, 18th, 19th, 21st to 25th, 29th, 30th, 31st.

Upper lake region.—3d to 6th, 12th, 17th, 18th, 21st, 22d, 24th, 25th, 26th, 29th, 30th, 31st.

Extreme northwest.—4th, 6th, 7th, 13th, 14th, 15th, 18th, 20th to 23d, 26th, 27th.

Upper Mississippi valley.—1st to 6th, 12th, 16th to 19th, 21st, 23d, 24th, 26th to 31st.

Missouri valley.—2d to 7th, 14th to 31st.

Northern slope.—1st to 5th, 13th to 21st, 23d, 25th, 26th, 27th, 30th, 31st.

Middle slope.—2d, 3d, 5th, 6th, 7th, 10th, 14th to 30th.

Southern slope.—1st, 3d, 4th, 7th, 8th, 11th, 12th, 13th, 16th to 20th, 22d to 27th, 29th.

Southern plateau.—2d, 3d, 4th, 7th to 12th, 18th, 23d, 25th, 30th.

Middle plateau.—4th, 7th to 12th, 18th, 26th, 27th.

Northern plateau.—2d, 3d, 4th, 6th, 7th, 8th, 11th, 12th, 19th, 20th, 21st, 25th, 28th to 31st.

Middle Pacific coast region.—1st, 2d, 6th, 12th, 15th.

South Pacific coast region.—Yuma, Arizona, 3d.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories as follows:

Arkansas.—6th, 10th, 13th, 15th, 16th, 18th, 20th, 25th, 27th.

California.—2d, 4th, 10th, 11th, 13th, 14th, 17th, 18th, 19th, 21st, 24th, 25th, 27th.

Colorado.—13th.

Connecticut.—12th, 13th, 21st, 26th to 29th.

Dakota.—5th, 10th, 11th, 15th, 16th, 19th, 24th, 28th.

Delaware.—18th.

District of Columbia.—7th, 12th, 25th.

Florida.—3d, 4th, 8th, 9th, 16th, 18th, 19th, 20th, 22d, 23d, 27th, 31st.

Georgia.—5th, 9th, 14th, 15th, 18th.

Idaho.—24th, 25th.

Illinois.—2d, 7th, 11th, 16th, 19th, 26th, 27th, 28th.

Indiana.—19th, 20th, 26th.

Iowa.—2d, 3d, 7th, 8th, 10th, 11th, 16th, 20th, 21st, 25th, 26th, 31st.

Kansas.—6th, 10th, 19th, 23d, 25th, 28th.

Louisiana.—4th.

Maine.—1st, 22d.

Massachusetts.—12th, 27th, 29th.

Michigan.—2d, 3d, 6th, 12th, 21st, 22d, 27th, 28th.

Minnesota.—14th, 18th, 21st, 24th, 27th, 31st.

Missouri.—10th.

Nebraska.—1st to 4th, 6th to 10th, 12th, 13th, 14th, 17th, 18th, 22d, 26th, 29th.

Nevada.—5th, 20th, 26th, 29th.

New Hampshire.—20th, 22d, 26th, 29th.

New Jersey.—12th, 16th, 18th.

New Mexico.—18th.

New York.—1st, 3d, 6th, 12th, 13th, 14th, 19th, 24th, 26th to 29th.

North Carolina.—2d, 5th, 7th, 10th, 16th, 21st, 25th, 28th.

Ohio.—5th, 7th, 11th, 12th, 15th, 17th, 18th, 19th, 21st, 23d, 25th, 27th, 28th, 30th, 31st.

Oregon.—10th, 18th, 23d, 24th, 27th, 28th.

Pennsylvania.—19th, 28th, 29th, 30th.

Rhode Island.—22d.

South Carolina.—1st, 5th, 9th, 11th, 19th, 21st.

Tennessee.—5th, 11th, 14th, 19th.

Utah.—25th.

Virginia.—6th, 7th, 17th, 19th, 23d, 25th, 26th.

Washington Territory.—4th, 11th, 29th.

Wisconsin.—11th, 20th, 21st, 27th.

Wyoming.—11th, 23d.

LUNAR HALOS.

Lunar halos were observed in the various states and territories as follows:

Arizona.—2d, 3d, 18th, 21st, 25th.

Arkansas.—24th, 27th.

California.—18th.

Connecticut.—24th, 27th.

Dakota.—17th, 18th, 21st to 24th, 26th, 29th.

Florida.—22d, 23d, 24th;

Georgia.—5th, 22d, 24th.

Idaho.—24th.

Illinois.—20th, 24th to 27th.

Indiana.—17th, 18th, 20th, 23d, 25th, 26th, 27th.

Iowa.—19th, 24th to 27th.

Kansas.—6th, 9th, 17th, 19th, 22d, 24th, 25th, 27th.

Kentucky.—23d.

Louisiana.—19th, 20th, 21st, 28th.

Maine.—26th.

Maryland.—20th, 23d, 25th.

Massachusetts.—21st, 22d, 26th, 27th.

Michigan.—20th, 21st, 23d, 27th, 28th.

Minnesota.—19th, 26th, 27th, 28th.

Missouri.—5th, 18th, 25th.

Nebraska.—14th, 20th, 22d to 25th, 30th.

Nevada.—22d, 27th.

New Hampshire.—21st, 22d.

New Jersey.—19th, 20th, 23d, 26th.

New York.—4th, 21st, 24th, 27th.

North Carolina.—13th, 18th, 23d, 25th, 26th.

Ohio.—20th, 21st, 23d, 25th, 28th.

Oregon.—21st, 22d, 24th.

Pennsylvania.—20th, 24th, 27th, 28th.

Rhode Island.—27th.

Tennessee.—20th, 23d, 25th, 27th, 28th.

Texas.—18th, 20th to 25th, 27th.

Vermont.—22d.
Virginia.—6th, 19th, 20th, 21st, 23d to 26th.
Washington Territory.—23d.
West Virginia.—21st.
Wisconsin.—20th, 21st, 26th, 27th, 28th.
Wyoming.—19th.

The phases of the moon during May, 1885, were: last quarter, 7th, 3.37 a. m.; new moon, 14th, 10.11 a. m.; first quarter, 21st, 12.39 a. m.; full moon, 28th, 3.25 p. m.; apogee, 4th, 5.18 a. m., and 31st, 6.54 p. m.; perigee, 16th, 4.54 a. m.

MIRAGE.

Mirage was observed at the following stations during the month:

Webster, Dakota, from 2d to 5th, 9th to 14th, 17th to 21st, 25th, 27th, and 30th.
Tucson, Arizona, 8th.
Harvard, Nebraska, 18th.
Manistique, Michigan, 19th, 25th.
Grand Haven, Michigan, 27th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty stations show 5,046 observations to have been made, of which thirteen were reported doubtful; of the remainder, 5,033, there were 4,284, or 85.1 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for May, 1885:

Date—May, 1885.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
2, 5 p. m...	0	20‡	.....	.....	.....	.....	7	70‡	Broad areas of faculæ.
3, 5 p. m..	1	20‡	2	5	1	3	6	85‡	Do.
9, 11 a. m...	.....	.....	.....	.....	.....	.....	9	90‡	
10, 11 a. m...	0	0	4	10‡	0	0	6	65‡	
11, 6 p. m...	1	5	0	10‡	0	0	7	60‡	Broad areas of faculæ.
12, 12 m	0	0	3	10‡	0	0	4	50‡	
15, 12 m	1	3	.....	.....	1	3	3	10	
16, 11 a. m...	1	15‡	0	3	.....	.....	4	25‡	
19, 10 a. m...	.....	.....	.....	.....	.....	.....	5	65‡	Two of the spots very large—one with bright nucleus in umbra.
5 p. m...	1	10‡	0	0	1	2	6	75‡	
21, 9 a. m...	1	2	0	0	0	0	7	75‡	
12 m	0	0	0	0	0	0	7	75‡	
4 p. m	0	10‡	0	0	0	0	7	85‡	
22, 4 p. m...	0	30‡	0	0	0	0	7	115‡	
24, 11 a. m...	1	2	0	0	1	2	8	100‡	
25, 4 p. m...	0	50‡	0	0	0	0	8	160‡	Three spots quite large.
26, 6 p. m...	1	5	1	5	0	0	8	150‡	Do.
28, 10 a. m...	2	5‡	.....	.....	2	5‡	8	85‡	Do.
29, 4 p. m...	1	5‡	0	15‡	0	0	9	50‡	Broad areas of faculæ.

Faculæ were seen at the time of every observation. ‡Approximated.

Prof. L. G. Carpenter, of the Michigan State Agricultural College, Lansing, reports sun spots during May, as follows:

1st, 7 p. m., seven groups, thirty-eight spots; 2d, 11 a. m., six groups, forty-five spots; 4th, 3.20 p. m., five groups, thirty spots; 11th, 3.45 p. m., six groups, twenty-five spots; 12th, —— p. m., five groups, thirty-three spots; 16th, 3.30 p. m., three groups, twenty-seven spots; 18th, 3.45 p. m., four groups, twenty-three spots; 28th, —— p. m., seven groups, thirty-nine spots.

The Chief Signal Officer has received from Mr. Frank Rede Fowke, Secretary to the Solar Physics Committee, Science and Art Department, London, S. W., a tabulated statement of the "dates of coincidence of the assumed prime meridian of the sun with the central meridan of the visible hemisphere," covering the period from 1873 to 1885, both inclusive. The following relating to the year 1885, is from the table above referred to:

Month.	Date.	Greenwich mean solar time.	Day of year and decimal of day.	Month.	Date.	Greenwich mean solar time.	Day of year and decimal of dry.
		h. m.				h. m.	
January	26	14 38	25.61	July	9	4 5	189.17
February	22	22 48	52.95	August	5	9 22	216.39
March	22	6 14	80.26	September	1	15 7	243.63
April	18	12 58	107.54	September	28	21 36	270.90
May	15	18 29	134.77	October	26	4 48	298.20
June	11	23 17	161.97	November	22	12 14	325.51
				December	19	19 55	352.83

The day of the year and the decimals of a day are reckoned from Greenwich mean noon of January 1st.

The assumed prime meridian is that which coincided with the ascending node of the sun's equator at the epoch 1854.0.

The assumed period of rotation is 25.38 mean solar days.

DROUGHT.

Bangor, Maine: on the 31st there was a heavy rainfall; previous to that date the crops were in need of rain.

Sanford, Florida: the rains on the 19th ended a drought which had prevailed in this vicinity for six weeks.

Cedar Keys, Florida: drought prevailed in this region during the month until the 21st, when 1.05 inches of rain fell. The drought had prevailed for two months and as a result, the water supply was very limited and crops suffered seriously.

Milwaukee, Wisconsin: up to the 29th, barley, oats and wheat were suffering in consequence of drought. The monthly rainfall was the least that has fallen in May during the last fourteen years.

Spokane Falls, Washington Territory: the rain on the 13th was of great benefit to the crops, which were suffering from drought.

Red Bluff, California, 31st: stockmen report that in the mountain regions the present season has been the driest known for many years, and that stock has suffered in consequence of poor pasturage and scarcity of water.

Beloit, Rock county, Wisconsin: the month of May was unusually dry in this region.

Sussex, Waukesha county, Wisconsin, 31st: the grain and grass crops suffered seriously from drought during the month, which was the driest known for ten years.

EARTHQUAKES.

Winnemucca, Nevada, 1st: a slight shock of earthquake occurred at 9.30 p. m., local time (12.21 a. m., 75th meridian). It was noticed by many persons in the central and lower portions of the town, while it was not perceptible east of the railroad. It is reported to have caused swinging lamps to vibrate, crockery and windows to rattle, etc. Persons out of doors did not feel the shock, but some report having heard a rumbling noise, which was supposed to have been due to the earthquake.

The following is taken from "Nature," of May 7, 1885:

At half-past 1 o'clock, on the morning of the 1st instant, two or three rather violent shocks of earthquake were felt at Vienna, Austria, accompanied by a rolling noise, and causing a great clattering of furniture.

Shocks of far greater violence were experienced in Styria, where many houses were damaged and some persons killed. In the western districts the shocks were of a light character. The phenomenon appears to have extended southward as far as Grätz and westward to Bavaria. A shock was also felt at Monte Carlo, at ten minutes to 3, on the morning of the 2d instant. The shock was strongest in the districts of Condamone and the Cap d'Aile.

Olympia, Washington Territory, 3d: a light earthquake shock occurred at 11.30 p. m. (local time). Light shocks continued until 1.30 a. m., of the 4th.

The following is taken from "Nature" of May 28, 1885:

Shocks of earthquake were felt at Wartberg and Kindberg, Austria, on May 20, toward 1.30 a. m.

A sharp shock was felt at Smyrna, Turkey, at 7.15 p. m., on May 26.

The "New York Journal of Commerce," of June 3, 1885, contained the following:

London, June 2.—A dispatch from Serinagur, India, says that city was visited by a frightful earthquake on Sunday last (May 31st). The shocks, which occurred at intervals of ten minutes, were of great violence. The greater part of the city was destroyed and the cavalry barracks is a mass of ruins. Fifty persons are known to have been killed and hundreds of the injured have already been taken from the general wreck. The total loss of life or the number of the maimed must remain unknown for some days, as many of the inhabitants still lie buried in the ruins. When the shocks were first felt and the people realized that they were being subjected to the awful possibilities of an earthquake the wildest panic seized them. Every one able to do so rushed from the tumbling houses and fled to the boats on the river and on the lakes, or sought the open country. The terrified inhabitants are now camped in the fields that surround the town.

Serinagur is near the centre of the vale of Cashmere, and that whole territory experienced the terrible earthquake shocks. The damage caused throughout the vale is enormous. The loss in cattle alone is very great. The affrighted people seem to be utterly helpless, and succor is being sent them as rapidly as the Indian authorities can organize relief. Many of the houses yet standing show large rents in the walls and must be razed to the ground. The shocks have not yet ceased, and this fact greatly retards the work of rescuing the the people pinned down in the debris, and it is feared many of these must perish before they can be reached by the relief parties.

FOREST AND PRAIRIE FIRES.

Baltimore, Maryland, 2d: a fire broke out in the woods near Back river, about ten miles east of this city, burning over an area about two miles in length. A quantity of fencing was destroyed.

Bethlehem, Pennsylvania, 5th: an extensive forest fire has prevailed along the Blue mountains in Northampton county. The area burned was covered with valuable timber.

Annapolis, Maryland, 8th: much valuable timber, cord wood, and fencing have been destroyed by forest fires on the north Severn river.

Lynchburg, Virginia, 10th: reports from various points in the counties along the Blue Ridge mountains state that the forest fires during the last two weeks have destroyed several dwellings with other property.

East Saginaw, Michigan, 16th: reports from Harrison state that nearly a million feet of pine logs in that vicinity have been destroyed by forest fires; the loss is estimated at $10,000.

Marquette, Michigan, 16th: forest fires have caused considerable damage along the Detroit and Milwaukee railroad, between this place and Saint Ignace. Five buildings at Newberry were burned.

Milwaukee, Wisconsin, 16th: reports from various towns to the west and northwest, within fifty miles of this place, state that many settlements have been endangered by forest fires, and that many homes have been abandoned.

Manistee, Manistee county, Michigan: property valued at $25,000 was burned in this vicinity on the 16th.

Ludington, Mason county, Michigan: extensive forest fires prevailed along the line of the Flint and Pere Marquette railroad on the 16th. The village of Tallman, in this county, was endangered, and the roads between that place and Manistee were rendered impassable.

Green Bay, Brown county, Wisconsin: on the 16th, forest fires prevailed to the west and northwest of this place in Brown, Oconto and Shawano counties, destroying much fencing and endangering the villages.

Edmore, Montcalm county, Michigan, 18th: Graffville, a small lumber town in this county, has been destroyed by forest fires, entailing a loss of about $40,000. At Stanton, also in this county, fifty-two houses were destroyed, involving a loss of $25,000.

Riverhead, Long Island, 18th: forest fires in Suffolk county have caused damage estimated at $60,000.

Middletown, Frederick county, Maryland: an extensive fire prevailed on South mountain, north of this place on the 19th.

Wilkesbarre, Pennsylvania: on the 19th extensive fires prevailed at Harvey's lake, twelve miles from this place; much valuable timber was destroyed.

Quebec, Province of Quebec: during the 21st and 22d the sun was obscured by smoke from fires which prevailed in the mountains to the north and northwest of this place.

Easton, Pennsylvania, 22d: the fires on Blue mountain in Northampton county, which were partly subdued two weeks ago, have broken out afresh. In Monroe county a considerable area has been burned over.

Williamsport, Pennsylvania, 23d: destructive forest fires have prevailed in Sugar valley and in the White Deer mountains during the past week. An area of twenty-five square miles has been burned over, destroying about $1,000,000 worth of property.

East Tawas, Iosco county, Michigan: on the 25th extensive forest fires were burning to the north and west of this place, destroying a large quantity of pine timber.

Mount Washington, New Hampshire: on the 16th the valleys to the west of station were almost obscured by smoke from forest fires. On the 17th, extensive fires prevailed in the valleys to the westward. These fires continued until the 23d.

Prairie and forest fires were also reported from the following places:

Humphrey, New York, 18th.
Escanaba, Michigan, 14th, 15th, 16th.
Grand Haven, Michigan, 16th, 17th.
Saint Vincent, Minnesota, 11th to 14th.
Fort Buford, Dakota, 9th.
Burlington, Iowa, 15th.
Yankton, Dakota, 1st, 2d, 3d, 5th, 9th, 10th, 13th.
North Platte, Nebraska, 13th.
Harvard, Nebraska, 30th.

INSECTS.

Bethel, Connecticut, 13th: the canker worm has caused some damage to orchards in this (Fairfield) county.

The San Francisco "Chronicle," of May 15th, reports that grass-hoppers have caused great damage throughout a large part of the foot-hill region of California. They have appeared in Placer, Yuba, Nevada, Amador, Napa, Sonoma, San Joaquin, Butte, Sacramento, El Dorado, Tehama, and Merced counties. The grainfields and orchards in many of these counties have been entirely ruined.

Nashville, Tennessee, 17th: reports from various parts of the state show that the "cut-worm" has caused great damage to crops. About the 28th potato bugs began to appear, and were very destructive. In some instances entire fields were destroyed in from two to three days.

Washington, District of Columbia: the seventeen-year locusts were first observed here on the 24th.

Salt Lake City, Utah: caterpillars appeared about the 20th, and caused much injury to trees.

Vevay, Switzerland county, Indiana: large numbers of insects of various kinds made their appearance about the 20th, and during the remainder of the month were very destructive to vegetation.

Anna, Union county, Illinois: the seventeen-year locusts began to make their appearance in large numbers on the 25th, causing damage to vegetables and early fruit in the lowlands.

Fort Myer, Virginia: large numbers of seventeen-year locusts made their appearance about the 26th. For several days previous to that date they were unearthed quite numerously by workmen engaged in grading at this place; they were first found at a depth of nine inches below the surface of the ground.

Denver, Colorado, 27th: reports from the south side of the Arkansas river above Pueblo, state that great numbers of grasshoppers have appeared in that region and have devoured early vegetables and shrubbery.

Little Rock, Arkansas, 28th: reports from Craighead, Crittenden and other counties in northwestern Arkansas state that locusts in vast numbers have suddenly appeared in that region, and have caused much damage to wheat. Locusts first appeared in the vicinity of Little Rock, on the 30th.

Reports from East and West Carroll parishes in Louisiana,

state that locusts and cotton worms have also appeared in those localities.

The Signal Service observer at Red Bluff, California, reports that during the month grasshoppers caused injury to vines, young trees and grain fields in that vicinity. In some instances the fields of grain were so badly damaged as to be not worth harvesting.

Emmitsburg, Maryland: locusts made their appearance in this locality on the 31st.

Lead Hill, Boone county, Arkansas, 31st: during the middle and latter portions of the month "cut worms" appeared in large numbers and were very destructive to gardens.

METEORS.

Wytheville, Virginia: at 7.52 p. m. on the 6th, a meteor of a pale yellow color was observed moving slowly in a course nearly parallel to the horizon. Its flight was from five to seven seconds duration.

Woodstock, Vermont: at about 9 p. m. on the 16th a large and brilliant meteor was observed. It passed from the southwestern sky to within 39° or 40° of the northeastern horizon producing a very bright light during its passage.

Lamar, Missouri: a brilliant meteor was seen moving from southeast to northwest at 4 a. m. on the 23d. Before disappearing, it exploded into many parts; it left a brilliant train.

Meteors were also observed at the following places on the dates set opposite:

Lead Hill, Arkansas, 1st.
Fort Scott, Kansas, 1st.
Woodstock, Maryland, 2d.
Variety Mills; Virginia, 2d.
Emmitsburg; Maryland, 7th, 14th, 18th.
Cincinnati, Ohio, 8th.
Webster, Dakota, 9th, 11th.
Prescott, Arizona, 12th.
Limona, Florida, 12th
Genoa, Nebraska, 14th.
Pittsburg, Pennsylvania, 14th.
Marion, Virginia, 14th.
Charleston, Illinois, 15th.
Sherlock, Kansas, 20th.
Baltimore, Maryland, 20th.
San Antonio, Texas, 21st.
Dale Enterprise, Virginia, 23d.

MIGRATION OF BIRDS.

Gesse flying northward.—Fort Yates, Dakota, 9th; Moorestown, Michigan, 12th; Mount Washington, New Hampshire, 6th; Stateburg, South Carolina, 11th; Tatoosh Island, Washington Territory, 23d, 24th; Manistique, Michigan, 3d, 4th.

Geese flying southward.—Yuma, Arizona, 2d; Eastport, Maine, 30th; Saint Vincent, Minnesota, 8th.

Cranes flying northward.—Embarras, Wisconsin, 11th.

Ducks flying northward.—Tatoosh Island, Washington Territory, 20th, 21st, 23d, 24th, 25th.

POLAR BANDS.

Archer, Florida, 2d, 4th, 7th, 11th.
Limonia, Florida, 7th, 10th.
Guttenberg, Iowa, 1st.
Yates Centre, Kansas, 10th.
Maud, Kansas, 4th, 6th, 8th, 12th, 23d.
Gardiner, Maine, 29th.
Escanaba, Michigan, 21st, 27th.
Mountainville, New York, 27th.
Wauseon, Ohio, 11th, 16th.
Nashville, Tennessee, 5th, 8th.
El Paso, Texas, 24th, 25th.
Wytheville, Virginia, 2d.

SAND STORMS.

Fort Thomas, Arizona, 4th.
Willcox, Arizona, 12th.
Yuma, Arizona, 14th, 15th.
Fort Yates, Dakota, 8th, 13th, 22d.

WATER-SPOUTS.

Schooner "Annie R. Lewis," L. L. Lewis, master, May 3d, at 6.45 a. m., in N. 23° 28′, W. 80° 39′, saw a water-spout; same day, at 5 p. m., in N. 25° 8′, W. 80° 5′, saw another.

Bark "Nordcap," E. Salvesen, master, on May 6th, near N. 40° 50′, W. 41° 00′, saw a water-spout.

Schooner "Annie R. Lewis," L. L. Lewis, master, on May 9th, 2.30 p. m., in N. 36° 28′, W. 73° 30′, during a heavy squall, saw several water-spouts, one of which passed over the schooner, but did no damage as it broke a short distance to windward of the vessel. The whirlwind accompanying it was terrific, lasting a few seconds.

S. S. "Edith Godden," J. H. Bennett, commanding, May 10th, 6.59 a. m., in N. 23° 0′, W. 74° 29′, saw a waterspout.

The following is from "Science," June 5, 1885:

Captain Sawyer, of the bark "Vidette," reports that on May 17th, 1885, a water-spout appeared to form and rise in the northeast in a long spiral column; position at time—latitude 32° 10′ north, longitude 78° 5′ west. It rose until the sky above, extending over an area of a mile, was an inky black mass of heavy clouds, gradually moving in a southwest direction until within half a mile of the vessel, when it seemed to burst, the rain coming down in torrents for two hours. This was accompanied by sudden, strong gusts of wind, shifting suddenly from one quarter to directly the opposite one, and with a force of six to eight. To the south and southwest before and during the formation of the water-spout, the sky, to an altitude of about sixty degrees, was black and very threatening, with thunder and lightning. This continued during the time alluded to, and finally ended with several sharp claps of thunder and a fifteen minutes' fall of hailstones. The peculiarity of these disturbances was that the wind would change very suddenly with considerable force, throwing all aback without any warning. The temperature of the water was 81° and of the air 60° to 78°.

S. S. "Edith Godden," J. H. Bennett, commanding, on the 18th, at 5 p. m., passed a water-spout in N. 30° 10′, W. 74° 38′.

Sanford, Florida, 23d: at 11.35 a. m., during a thunderstorm and heavy wind squall over Lake Monroe, a water-spout formed on the northern side of the lake. It was composed of a vaporous, funnel-shaped cloud, extending downward until it was joined by a similarly shaped body of water rising from the lake. It moved in an easterly direction for about half a mile and then disappeared, having remained visible for eight minutes. The water-spout was accompanied by a roaring sound.

ERRATA.

In the January REVIEW, page 19, in the table of miscellaneous data, the departure from the normal pressure at Fort Concho, Texas, —.05, should read +.05.

In the March REVIEW, page 66, under "deviations from average precipitation," Milledgeville, Georgia, monthly precipitation, 3.32, is 5.55 below the March average, should read 5.55 below that for March, 1884, and 2.00 below the March average.

NOTES AND EXTRACTS.

The following extract is from the May, 1885, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., Auburn:

The temperature for the month has varied but little from that of May last year.

The rainfall has been in excess of the normal one or two inches. The close of the month was characterized by almost constant rains, and in some of the large streams floods were seriously apprehended. The first few days being dry and mild, the farmers were able to clean out their crops and place them in a favorable condition for the growing rains that closed May. The excessive rains from the 19th to the 31st slightly injured the cotton plant, but this unfavorable result was counterbalanced by the rapid and vigorous growth given to the small grains. The peculiar condition of the weather during the first part of the month brought out numerous cut-worms in all sections of the state, which did much damage to field and garden crops; the humid condition of the atmosphere, however, during the last days, enabled the plants to outgrow this attack, and the close of the month finds the farmers and truck gardeners generally in good spirits.

The average temperature, 60°.7, for the spring just closed, is from one to four degrees below the average. The coldest days were March 23d, April 4th,

and May 11th. The warmest days were March 28th and 31st, April 25th and 30th, and May 25th to 30th.

The average precipitation, 13.17, for the spring, is from one to three inches below the average.

State summary.

Mean temperature, 69°.7; highest temperature, 96°, at Livingston on the 30th; lowest temperature, 34°, at Gadsden on the 11th. Range of temperature, 62°; greatest monthly range of temperature, 58°, at Calera; least monthly range of temperature, 24°, at Wetumpka; mean daily range, 16°.3; greatest daily range of temperature, 44°, at Selma on the 16th; least daily range of temperature, 0°, at Fayette on the 27th and at Livingston on the 19th.

Mean depth of rainfall, 6.21 inches; mean daily rainfall, 0.20; greatest depth of monthly rainfall, 12.96 inches, at Bolling; least depth of monthly rainfall, 2.27 inches, at Clintonville; greatest daily rainfall, average for state, 0.87 of an inch, on the 27th; greatest daily local rainfall, 5.30 inches, at Pine Apple, on the 30th; days of general rainfall, 6th, 12th, 19th, 21st, 22d, 23d, 26th, 27th, 28th, 29th, 30th.

Average number of days on which rain fell, 11; average number of cloudy days, 13; average number of fair days, 11; average number of clear days, 7; warmest days, 24th, 25th, 28th, 29th; coldest days, 10th and 11th.

Prevailing direction of wind, southwest.

The following is an extract from the May, 1885, report of the "Georgia Weather Service," under direction of Hon. J. T. Henderson, Commissioner of Agriculture:

The mean temperature of the month of May has been four degrees below the general average temperature for this month as deduced from meteorological observations of ten years, while the rainfall has been nearly twice the usual amount, approaching closely to the average for the month of April.

The number of rainy days in the different sections has varied from five to twenty-three, the greatest number occurring in north Georgia, while the heaviest precipitation and largest total rainfall, contrary to what is usual at this season of the year, has occurred in the more southerly portions of the state.

The low temperature has retarded the growth of plants and furthered the destructive work of the cut-worm, of which there has been much general complaint. But the weather conditions have been by no means as unfavorable to most crops as those of the preceding month.

The following meteorological summary and accompanying remarks are from the May, 1885, report of the "Indiana Weather Service," under direction of Prof. H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Monthly mean.	
	°	°	°	
Northern counties	89	29.5	58.4	4.59
Central counties	87.7	24	60.1	3.14
Southern counties	87	35	62.6	3.71
State	89	24	60.4	3.81

The mean temperature of the state for May, 60°.39, was 1°.19 below that for last year; 3°.61 below the mean of fourteen years at Indianapolis; 1°.34 above the mean of nine years at Wabash; 3°.58 below the mean of twenty-six years at Logansport, 0°.91 below the mean of thirty-one years at Spiceland, 5°.01 below the mean of twenty-one years at Vevay, 1°.17 below the mean of six years at this station, and about 3°.50 below the normal.

The mean precipitation for the State for May, 3.81 inches, was 0.20 inch below that for last year; 0.63 below the mean of fourteen years at Indianapolis; 0.46 below the mean of nine years at Wabash; 0.10 below the mean of three years at Worthington; 0.41 below the mean of twenty-six years at Logansport, 0.22 above the mean of twenty-six years at Spiceland, 0.28 above the mean of twenty-one years at Vevay, 0.87 below the mean of six years at this station, and about 0.50 inch below the normal.

The season has been from one to three weeks late. Locusts appeared in the southern counties during the last week of May, and in the central counties during the first week of June.

A severe thunder-storm accompanied by high wind and hail occurred at Spiceland on the 24th. Precipitation, 1 inch; thermometer fell 27°. On the evening of the 22d a very heavy rainfall occurred at Brookville. Three inches of rain fell in three hours, the railroad tracks were washed out, the canal bank broken and much other damage done. The heavy rainfall seems to have been the result of the union of two storms, one from the southwest and the other from the northeast. The storm passed to the eastward after the union.

The frost of the 10th did some damage to crops at Knightstown.

The following is the May bulletin of the "Iowa Weather Service," under the direction of Dr. Gustavus Hinrichs, Iowa City:

May, 1885, was cool and windy, westerly winds prevailing.

The mean temperature of the air was one and a half degrees below normal. Since 1860, May has been five times much colder, namely in 1883, 1882, 1878, 1873, and 1867. Generally, once in three years, May is as cold, or colder, as it was this year.

The first decade was remarkably cold, being seven degrees below normal; on the 7th, a slight snow fell in northern Iowa, and ice had formed on standing water. This cold continued till the 9th. The second decade was only one and a half degrees below the normal, and the 18th was its coldest day. The third decade was decidedly warm, being three degrees above normal, and the temperature running up above 80° on the 22d and 23d.

The number of days with rain was about normal and the total amount was about 30 per cent. in excess of normal. The heaviest rain occurred on the 28th and 29th, exceeding two inches.

No destructive storms have visited Iowa; tornadoes are yet restricted to southern states. The cold, high winds from the 6th to the 9th were succeeded by a spell of remarkably fine weather, lasting till the 16th.

The continued cold weather left the ground cold till into the third decade, and must be the main cause of the failure of much of the corn planted before the 25th.

The spring season now closed has been about two degrees below the normal and vegetation is accordingly very backward.

For the first time since the white race inhabits this valley have we had three consecutive severe winters. We now can see not only additional gaps in our orchards, but even the Concord grape-vine is almost killed.

The normal cold spells of May were severe, but set in extraordinarily early, namely, four days in advance of the normal date. Vegetation being very backward, no harm could be done to fruit buds.

The following extract is from the May, 1885, report of the "Louisiana Weather Service," under direction of Mr. Robert S. Day, New Orleans:

The mean temperature for the month of May was 1° below that for the same month last year, but the extremes were slightly greater. From the 1st to the 15th it was cooler and the rest of the month warmer than usual. Two cold waves crossed the state on the 3d and 5th, and on the 9th and 11th, the former being quite severe, but doing no damage to crops.

The rainfall was quite evenly distributed, and about one-half the quantity of last year's average.

No excessive weather is reported, and all farm work has progressed uninterruptedly.

The following meteorological summary and accompanying remarks are from the May, 1885, report of the "Indiana Volunteer Weather Service," under direction of Professor W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Precipitation.
	Highest	Lowest.	Monthly mean.	
	°	°	°	
Northern counties	88	24	57.4	4.80
Central counties	90	24	59.9	2.90
Southern counties	90	32	62.9	3.65
State	90	24	60.1	3.78

The weather conditions of the state were dominated by a high barometer on the 3d, 15th, 16th, 19th, and by a low on the 1st, 5th, 6th, 7th, 8th, 9th, 17th, 18th, 28th, 29th, 30th. And on the 2d, 4th, 10th, 11th, 12th, 13th, 14th, 20th, 21st, 22d, 23d, 24th, 25th, 26th, 27th, 31st, neither cyclonic nor anti-cyclonic forces were present in an important degree.

The temperature seems to have ranged from one to four degrees below the normal at various stations. The highest temperatures occurred at most stations on the 24th, in connection with a low barometer central, that morning, north of the lakes, and a high barometer central off the middle Atlantic coast. The lowest temperatures occurred mostly on the 3d, 8th, and 10th, in connection with high barometers central, on the 3d, in the middle Mississippi valley, on the 8th, north of Montana, and on the 10th, north of Dakota. There was a low central over the Gulf of Saint Lawrence on the 3d, one central north of Lake Superior on the 8th, and north of New York on the 10th.

The rainfall was tolerably evenly distributed through the month and over the state. The number of stations reporting and the aggregate precipitation on the various days of the month follows, in the order of date, number of stations, aggregate precipitation: 1st, 16, 1.53; 2d, 2, 0.12; 3d, 25, 2.06; 4th, 3, 1.00; 5th, 19, 4.57; 6th, 31, 23.31; 7th, 7, 0.54; 8th, 7, 0.82; 9th, 13, 0.74; 10th, 4, 0.03; 12th, 24, 0.68; 13th, 11, 0.20; 18th, 10, 0.67; 19th, 9, 0.60; 21st, 28, 7.83; 22d, 25, 11.47; 23d, 11, 3.35; 24th, 27, 11.60; 25th, 13, 4.10; 26th, 3, 0.02; 27th, 19, 4.25; 28th, 24, 11.67; 29th, 29, 18.21; 30th, 28, 10.32; 31st, 3, 0.02; none, 11th, 14th, 15th, 16th, 17th, 20th. Thunder-storms were general on the 5th, 6th, 18th, 21st, 22d, 23d, 24th, 29th, 30th. The heaviest rains occurred on the 6th, in connection with a low barometer central, that morning, in the middle Mississippi valley, and on the 29th, with low central, in a. m., in Iowa. A well-marked storm-centre crossed the state on the 30th. The barometer gradients around it were not steep, and no great force was developed. Snow fell at Miami and Wabash on the 8th. Frosts are reported from central and southwestern stations on the 2d, 3d, 8th, 10th, 11th.

Examination of the records in our possession discovers no steady correspondence between the temperature of April and succeeding May, or winter and succeeding spring. It seems, however, to be a pretty well established rule that if the departure from the normal, above or below, is very great, for any limited period, the departure for the succeeding like period is apt to be in the same

direction. As an illustration we have, at Logansport, winter 1870–1, 5°.7 above, spring 4°.8 above; winter 1866–7, 6°.3 below, spring 6°.7 below; at Spiceland, 1877–8, 7°.0 above, 4°.8 above; 1884–5, 7°.0 below, 2°.5 below; Vevay, 1879–80, 8°.5 above, 4°.4 above; 1872–3, 5°.0 below, 1°.2 below. At Logansport, warmest spring, 1860, coldest, 1857; Spiceland, 1871, 1857; Indianapolis, 1878, 1885; Vevay, 1871, 1869. Greatest and least precipitation: Spiceland, 1862, 1870; Indianapolis, 1880, 1872; Vevay, 1865, 1879.

Total wind velocity; Lafayette, 5,920 miles; Indianapolis, 4,101; Greencastle, 5,253.

The following is an extract from the May, 1885, report of the "Minnesota Weather Service," under direction of Prof. W. W. Payne, of Carleton College, Northfield:

The mean temperature of May, in Minnesota, has been slightly below the normal for nearly all portions of the state, the differences amounting to —1°.7 at Duluth, —0°.6 at Moorhead, —2°.5 at LaCrosse, and —1°.6 at Saint Paul. The temperature from the 1st to 5th was mild in all sections. During the night of the 4–5th, there was a remarkable fall in temperature, amounting at most stations to 25°, ushering in a cold term which lasted until the 10th. High winds, light snows, frost and ice occurred during the continuance of this cold term, but because of the backwardness of the spring, little damage was done to vegetation except to delay its progress. The minimum temperatures for the month were reported at nearly all the stations on the morning of the 7th. The temperatures at Saint Paul, 26°.6, and LaCrosse, 29°.5, on that date, were the lowest since 1875. After the 10th, the temperature became gradually warmer, and vegetation made rapid progress. The last frosts occurred on the 18th and 19th; that of the latter date was severe in the southeast part of the state, causing damage to early vegetables and fruit at Rochester and La Crosse. Southerly winds prevailed from the 20th to the 23d, with a rapid rise in temperature which culminated on the 23d, when the highest mean and maximum temperatures for the month were observed. From the 24th to the end of the month, the weather was mild and equable.

The fluctuations of the barometer were not marked for May, the highest readings were on the 2d, and lowest on the 4–6th, and 15th. The highest reading was 30.257 at Bird Island on the 2d, and lowest 29.443 at Moorhead on the 15th.

There was a marked deficiency in the rainfall for May, throughout the state, with the exception of the extreme northwest in the Red River valley, where an excess is complained of. This deficiency was greatest in the central western part of the state where it amounted to from 3 to 3.6 inches. One station, Bird Island, reported only 0.44 inch for the month. In other parts of the state the deficiencies ranged from 1.2 to 3 inches. The 6th, 7th, 16th, 17th, 20th, 21st 23d, 24th and 30th, were the dates of the greatest precipitation, showing the rain to have been well distributed, and thus while deficient in amount, yet of great benefit to vegetation.

Precipitations of .50 of an inch or over were observed as follows: Moorhead 1.18 on 15th, and .92 on 23d; Duluth, .54 on 6th; Saint Paul, .86 on 17th; La Crosse, 1.02 on 17th, .84 on 24th; Park Rapids, .59 on 24th; Wadena, .90 on 21st, .60 on 23d; Hastings, .92 on 6th, .53 on 16th; Redwing, .74 on 17th; Dodge Centre, 1.15 on 20th, .52 on 24th; Northfield, .70 on 17th, .85 on 24th.

The 30th was notable for the number of thunder storms and light rains which occurred on that date.

The following is the May, 1885, report of the "Missouri Weather Service," under the direction of Prof. Francis E. Nipher, Saint Louis:

The mean temperature during the past month has been somewhat below the normal for May. At the central station it was 63°.7, which is 2°.6 below the normal for Saint Louis. The highest temperatures during the month were observed in the first part of the third decade, generally on the 24th. At Saint Louis the maximum reached was as high as 90°.3.

The lowest temperatures were observed in the latter part of the first decade. The cold winds from the northwest on the 5th and 6th lowered the temperature 15° to 25° over the whole state in from twenty-four to thirty-six hours. The greatest change was at Savannah, 29°.

On the 8th there was white frost in several parts of the state, on the 7th and 10th white frost was also observed in some few localities.

The records show the following observations: Greenfield, on the 8th, 9th, 10th, 15th; Graham, 7th, 8th, 9th; Chamois, 8th, 9th, 10th, all tender vegetation killed on the morning of the 10th; Kirksville, on the morning of the 7th, strawberry foliage frozen, but fruit not damaged; Protem, 8th, 9th, 10th, garden vegetation seriously injured on the uplands; Mexico, 8th, 9th; Hannibal, ground frozen in enclosed space on the 7th; Ironton, 10th, 11th; Lexington, frosts on the 1st, 9th, 10th, 11th; thin ice on the morning of the 8th; Miami, 8th, 9th, 10th, 11th; Glasgow, 8th, 10th; Oregon, 2d, 7th, 8th, 9th, 10th, no injury done to fruits on account of dry atmosphere; Keokuk, 7th, 10th.

The precipitation has been pretty evenly distributed all over the state, the heaviest being in southwestern parts. The greater portion of the rainfall was in the latter part of the month. The rainstorm of the night of the 27th did a great deal of damage to crops and property in the neighborhood of Steelville.

Snow was observed in different parts of the state on the 6th and 7th (Greenfield 7th); Ironton, snow and sleet on 7th.

Notes.—Chamois, wheat brought out somewhat by the rains in latter part of the month, but will not make more than one-fourth of an average crop. Corn small and uneven, owing to bad weather and poor seed.

Kirksville, crops backward.

Protem, corn late and small; cotton good and promising; wheat will be light.

Houstonia, outlook for winter wheat poor; a great deal plowed up and put in corn; spring wheat good, corn very poor; cold, wet weather and poor seed the cause.

Glasgow, strawberries fine and plentiful, good crops of small fruits.

Rainfall record at Saint Charles incomplete.

The corn-crop is generally backward and poor, due to the cool and wet weather, and wheat prospects very poor.

The following is an extract from the May, 1885, report of the "Nebraska Weather Service," under direction of Professor Goodwin D. Swezey of Doane College, Crete:

The temperature for the month of May has been below the average by about four degrees. In 1882 the month was two degrees cooler than this, but in all other years since 1879 it has been warmer. But one considerable cold wave passed over Nebraska which was on the 6th and 7th, the thermometer falling about twenty degrees. This cold wave came from the northwest, appearing in Dakota on the 5th and disappearing off Florida on the 9th.

Three general storms have swept across the country during the month, bringing rain to Nebraska and passing eastward chiefly over the lake regions; these were about the 5th, 15th and 29th; the first and last were here accompanied by slight rains, the second by the heaviest rains of the month. Local rains also fell on various other dates, amounting in all to about 4.39 inches, which is about the normal rainfall for May.

The wind record for the month has been low; so has also the record of hail and thunder-storms.

The average of rain for the different sections of the state for May, 1885, is as follows: northeast section, 4.48 inches; southeast section, 4.84; northwest section, 3.43; southwest section, 3.68; greatest number of days of appreciable precipitation, 12, at York.

The following is an extract from the May, 1885, bulletin of the "New England Meteorological Society," under direction of Prof. Winslow Upton, Providence, R. I.:

The following discussion of the meteorological conditions for the month is based upon reports from one hundred and ten observers, and upon the current publications of the United States Signal Service:

General Conditions.—The month was generally cool, with frequent light rains and only a few high winds. The conditions were favorable to vegetation, frosts having been few and mostly confined to the early days of the month. A marked peculiarity of the month was the almost total absence of thunder-storms.

Precipitation.—The rainfall was generally less than the average, though a few stations report an excess. At the majority of stations the amount was distributed through the month with approximate regularity, the rains occurring at intervals of four or five days. The deficiency at the summit of Mount Washington was very marked, the amount being the smallest on record at that station in May. The variation in the rainfall at Mount Washington, however, is quite large, as shown by comparing the records of the same month in different years. During the fourteen years of observation, the precipitation in May has ranged from 2.29 inches, in 1885, to 12.50 inches in 1881. But few instances of heavy rains were reported. Snow fell at a few stations in the northern portion of the district in the storm of the 1st and 2d. Hail fell at Williamstown, Massachusetts, on the 10th and 31st.

Temperature.—The mean temperature of the month was in general below the average, but from comparision with records for previous years at the different stations the results are quite discordant, not a few observers reporting an excess. There were no extremes of cold and but few days of unusually high temperature. Readings above 90° were recorded at four stations on the 19th.

Pressure.—The barometric pressure showed a small range. Thus, at Gardiner, Maine, the highest and lowest readings (reduced to sea-level) were 30.29 and 29.50; at Blue Hill, 30.30 and 29.53, and Albany, New York, 30.27 and 29.60 respectively. Five barometric depressions passed sufficiently near the district to affect the meteorological conditions. The first advanced from the southwest and was central at Cape Cod on the 2d. It was accompanied by general rain and violent winds. The second was a light depression on the Carolina coast on the 7th, which was attended by rain in the southern portion. The third advanced down the Saint Lawrence valley on the 10th, the rains being general. The fourth moved up the Atlantic coast on the 14th and 15th, wholly beyond the coast-line, but causing general rain and high winds on the coast. The fifth moved from the lake region eastward to Maine on the 18th and 19th, and was attended by general rains. The sixth was a depression moving from the lake region eastward to Nova Scotia as the month closed. The rain connected with this depression was general, and is partly included in May and partly in June. Local rains, especially in the northern portion of the district, occurred in connection with the area of high pressure which followed the fifth depression mentioned above.

Winds.—The winds were light, except in connection with the first and fourth depressions mentioned above. The highest hourly velocities reported were: 2d, Eastport, Maine, 41 miles; Blue Hill, 48 miles; Mount Washington, 98 miles; 14th, Boston, 44 miles; Block Island, 52 miles. The total wind movement for the month at Boston was 7,811 miles, Blue Hill, 11,840 miles, Mount Washington, 18,040 miles. The last named is 4,117 miles less than the May average.

Thunder-storms.—No general thunder-storm was observed in New England. In connection with the rain of the 19th, thunder and lightning were noted at

Burlington, Charlotte, Chelsea, Lunenburg, and Strafford, Vermont, (6.30 p. m.,) and Saint John, N. B. On the 9th thunder was noted at Littleton, New Hampshire, Chelsea and Lunenburg, Vermont. On the 27th a thunderstorm occurred at Eastport, Maine. Distant lightning, with no thunder, was noted at Setauket, Long Island, on the 4th, 8.30 p. m., in the south; and at Providence, Rhode Island, on the 25th, at 9 p. m., in the southwest. On the 25th, 5.30 p. m., thunder was heard at Norfolk, Connecticut, a heavy cloud passing north of the town, moving from west to east.

Advance of the Season.—The late opening of the spring noted in the April Bulletin was followed by a steady growth, so that at the close of May vegetation seems to be as far advanced as usual. At Fitchburg, Massachusetts, the dates of apple-blossoming in the twenty-nine years of the record range between May 13 and June 5, averaging May 24; this year the date is May 25. At Bridgeton, Maine, the dates of cherry-blossoming in the eight years of the record range between May 9 and June 24, averaging May 21, which is the date this year.

The following summary for May, 1885, is from an advance report of the "Ohio Meteorological Bureau," under direction of Professor T. C. Mendenhall:

Atmospheric pressure.—Mean for the state (observations at twenty-one stations), 29.91 inches; highest monthly mean, 29.96 inches at Dayton, Montgomery county; lowest monthly mean, 29.73 inches at Portsmouth, Sciota county; greatest monthly barometric range, 0.75 inch at Ironton, Laurence county, and Canton, Stark county; least monthly barometric range, 0.63 inch at College Hill, Hamilton county.

Temperature.—Mean for the state (observations at thirty-three stations), 56°.1; highest monthly mean, 63°.3, at Waverly, Pike county; lowest monthly mean, 55°.6, Cleveland; Maximum, 91°, at Portsmouth, Scioto county, on the 5th; minimum, 21°, at Wauseon, Fulton county, on the 3d; monthly range for the state, 70°; station reporting largest monthly range, Wauseon, 62°.3; station reporting least monthly range, Hiram, Portage county, 47°.

Precipitation.—Average for state, (observations at thirty-three stations), 4.06 inches; largest monthly, 5.92, at Ohio State University; smallest monthly, 1.78 at College Hill.

The following is an extract form the report of the Tennessee Weather Service, for May, 1885, under direction of Hon. A. J. McWhirter, commissioner:

There were no special meteorological features for May except the continued daily rainfall during the ten days ending on the 30th.

A cold wave appeared on the 8th in the western portion of the state, and on the succeeding day in the middle and eastern portions, causing a fall of temperature of from ten to twenty degrees. This continued until the 11th and was accompanied by frosts of greater or less severity, those of the 10th and 11th doing some damage in a few localities to young corn and cotton, and to tender vegetables.

The mean temperature for the month was 64°.53, 1°.89 below the mean of last May, and about the same as that of May, 1883. The mean of maximum temperatures was 86°.25, and that of the minimum temperatures 41°63; the former 1°.25 above, and the latter 6°.37 below, the respective means of last year, showing a greater range. The highest temperature was recorded about the 18th, 23d and 24th, and the lowest about the 10th and 11th.

The average rainfall was 4.27 inches, 1.52 inches greater than the average for the month of April (which, by the way, was abnormally low), and 0.69 inch greater than the average for the corresponding period last year. A large proportion of this was received by the eastern half of the state, while in the western portion the fall was very light. The eastern division received an average of 5.64 inches, the middle division an average of 4.55 inches, and the western division an average of only 2.62 inches. The greatest rainfall was 7.99 inches, reported at Beech Grove, and the least was 1.49 inches reported at Covington, near the western boundary. The greatest daily rainfall was 3.20 inches, reported at Pulaski on the 27th. The days of the greatest rainfall were the 6th, 19th, 26th and 27th, and were all general rains. The first named was the greatest of the month, the fall amounting to an average of 0.94 inch for the state. The rains from the 19th to the 30th, inclusive, were general rains and were heaviest in the middle division. The 2d, 3d, 4th, 9th, 10th, 14th, 15th, 16th and 17th were reported rainless days.

SUMMARY.

Temperature.—mean, 64°.53, highest, 94°, on the 24th, at Hohenwald and Somerville; lowest, 33°, on the 10th, at Kingston Springs; range 61°; mean monthly range 44°.83; greatest monthly range 60°, at Hohenwald; least least monthly range, 35°, at Howell and Florence station; mean daily range, 16°.74; greatest daily range, 42°, on the 4th, at Kingston Springs; least daily range, 2°, on the 2d, at Dickson, on the 7th at McKenzie, on the 21st, at Hardison's Mills, on the 26th, at Paris, and on the 30th, at Austin; mean of maxima, 86°.25; mean of minima, 41°.63.

Rainfall.—mean depth, 4.27 inches; mean daily, 0.138 inch; greatest, 7.99 inches, at Beach Grove; least, 1.49 inches, at Covington; greatest local daily, 3.20 inches, on the 27th, at Pulaski; days of greatest, 6th, 19th, 26th, 27th; day of greatest, 6th.

Average number of days on which rain fell, 10.3; of clear days, 10.5; of fair days, 9.8; of cloudy days, 10.7:

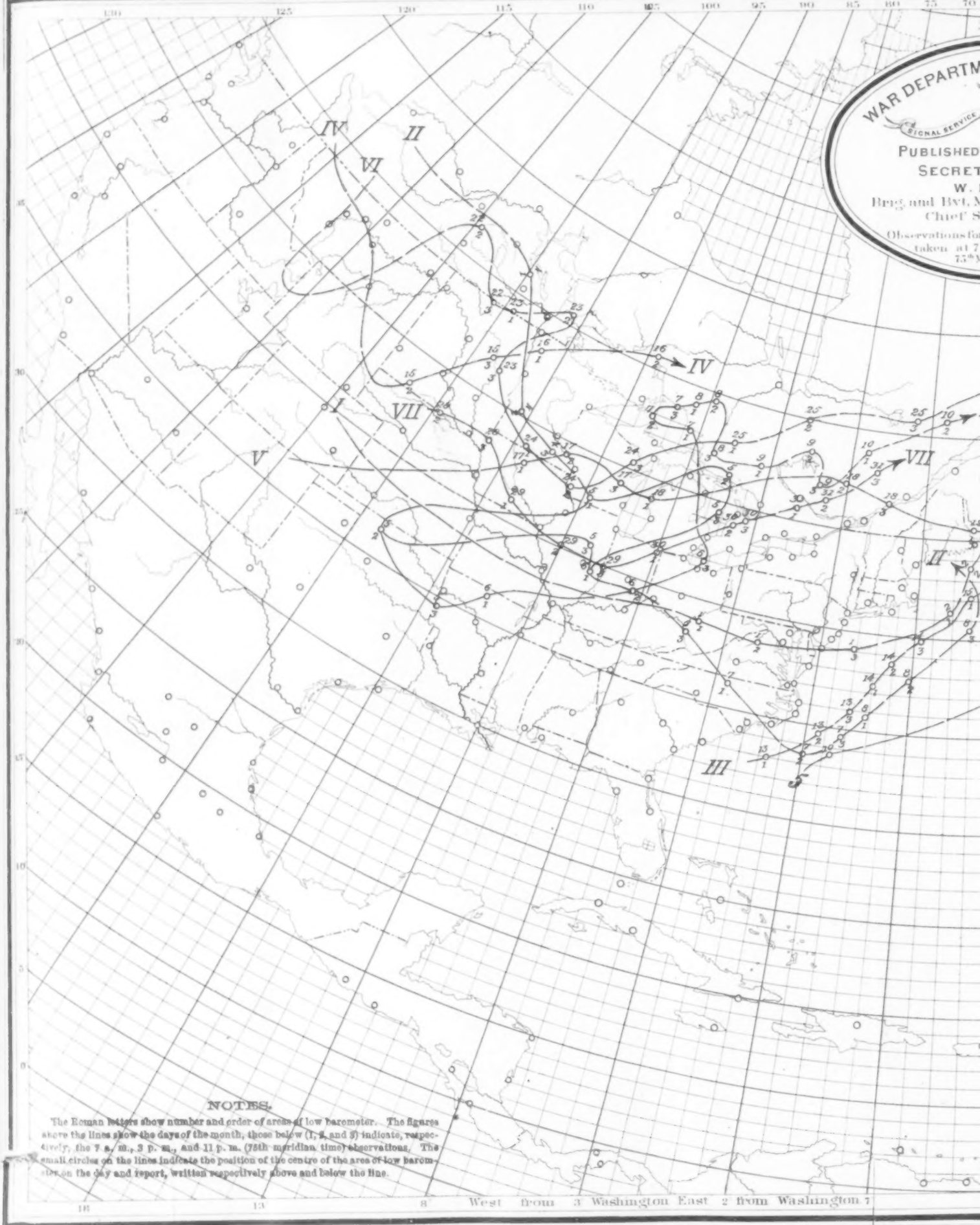
Coldest days, 10th, 11th.

Warmest days, 18th, 23d, 24th.

Prevailing winds, south and southwest.

Form 106 C 1884

Chart I. Tracks of Lo


WAR DEPARTM
SIGNAL SERVICE
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W.
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Observations fo
taken at 7
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IV
II
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VII
II
NOTES.
The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month, those below (1, 2, and 3) indicate, respectively, the 7 a. m., 3 p. m., and 11 p. m. (75th meridian time) observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.
West from Washington
East from Washington

# of Low-Barometer Areas, May, 1885.

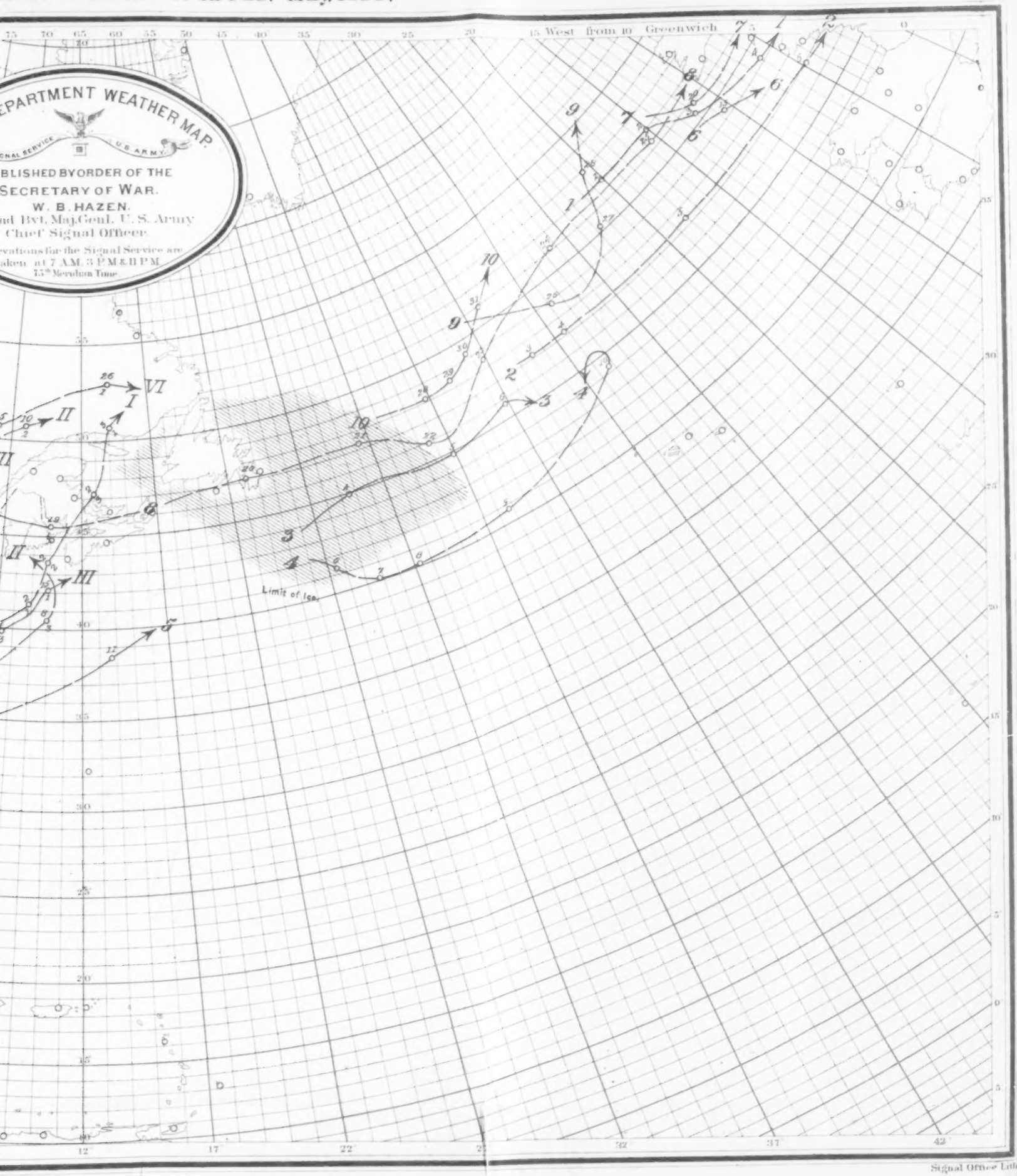


Chart II. Isobars, Isotherms, and Winds. May, 1883.

Form 106 F.

Chart II. Isobars, Isotherms, and Winds. May, 1885.

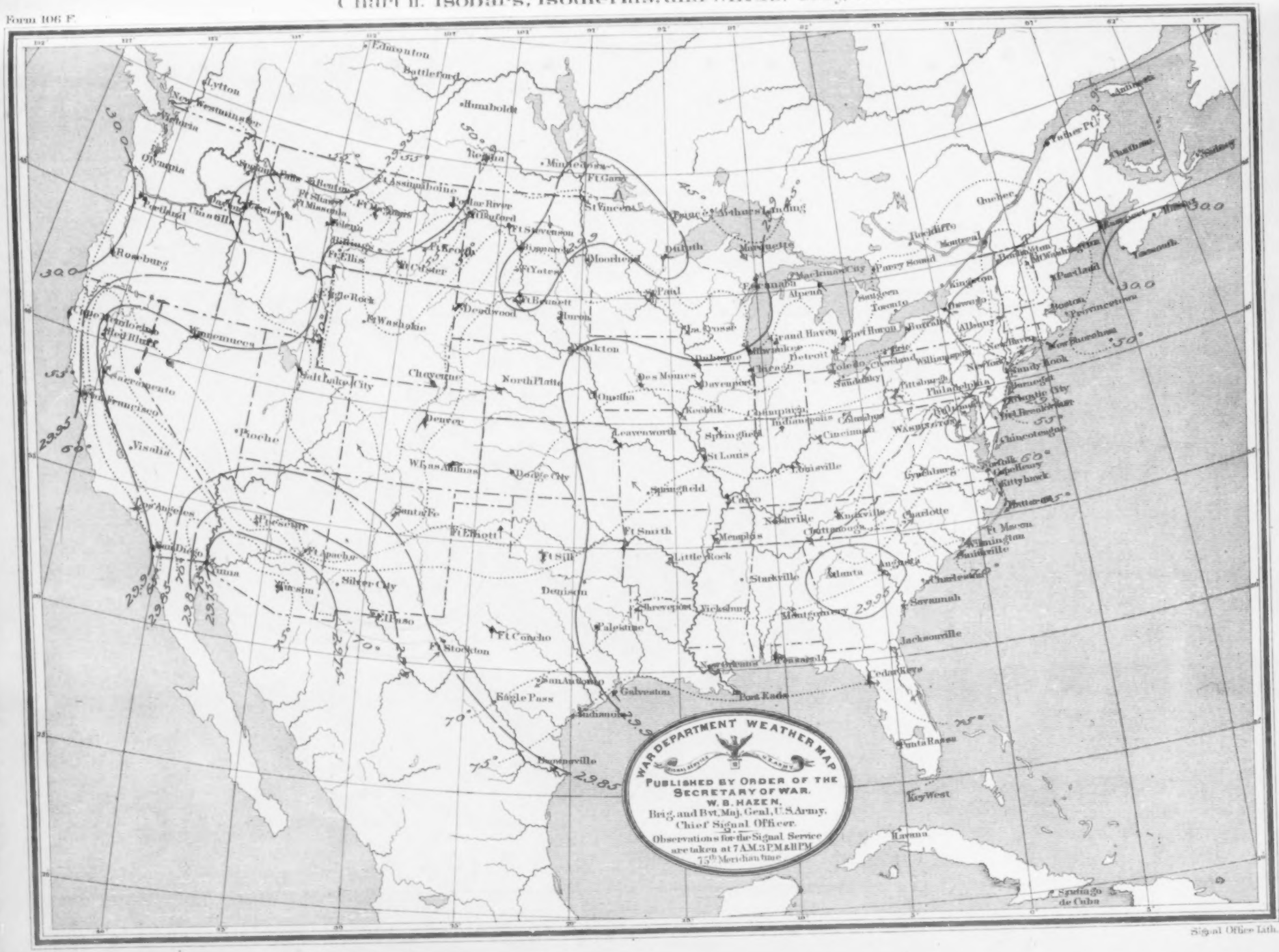
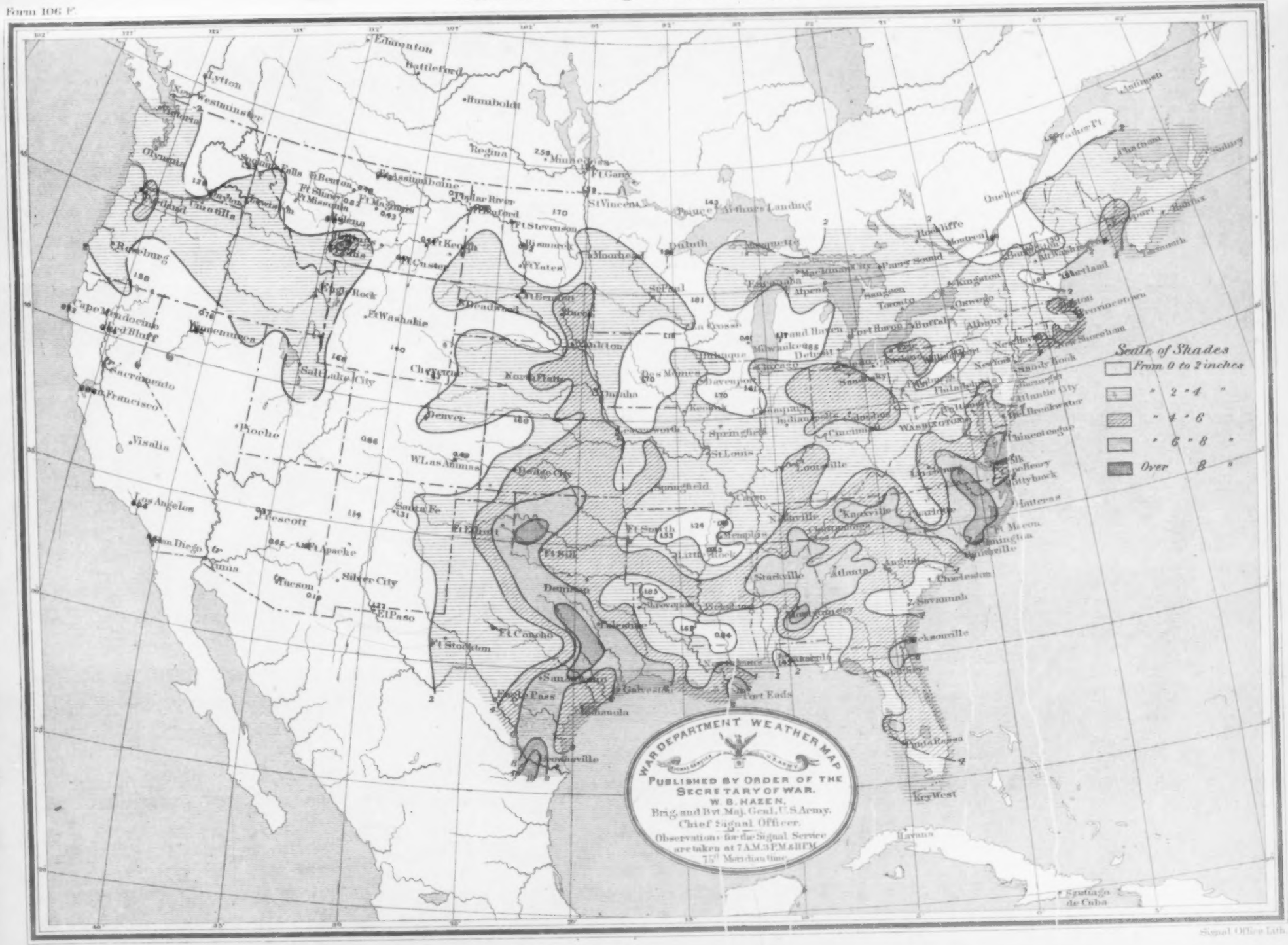

WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Genl, U.S. Army,
Chief Signal Officer.
Observations for the Signal Service are taken at 7 AM, 3 PM & 11 PM, 75th Meridian time
Edmonton
Battleford
Humboldt
Prince Arthurs Landing
Duluth
Marquette
Moorhead
Fort Yates
Fort Bennett
Deadwood
Huron
Yankton
Omaha
Des Moines
Davenport
Leavenworth
St Louis
Springfield
Cairo
Louisville
Cincinnati
Indianapolis
Columbus
Detroit
Milwaukee
Chicago
Toledo
Cleveland
Buffalo
Albany
Boston
Portland
Quebec
Montreal
Toronto
Kingston
Oswego
Parry Sound
Marquette
Alpena
Grand Haven
Port Huron
Sandusky
Pittsburgh
Philadelphia
Baltimore
Washington
Lynchburg
Charlotte
Knoxville
Nashville
Chattanooga
Memphis
Little Rock
Fort Smith
Fort Sill
Fort Elliott
Santa Fe
Denver
North Platte
Cheyenne
Salt Lake City
Fort Custer
Fort Keogh
Fort Stevenson
Fort Assiniboine
Fort Shaw
Fort Missoula
Fort Ellis
Fort Lapwai
Fort Klamath
Fort Canby
Fort Bidwell
Fort Boise
Fort Stanton
Fort Concho
Fort Stockton
Fort Apache
Fort Lincoln
Fort Custer
Fort Yates
Fort Bennett
Fort Sully
Fort Meade
Fort Niobrara
Fort Robinson
Fort Hays
Fort Riley
Fort Leavenworth
Fort Gibson
Fort Reno
Fort Sill
Fort Elliott
Fort Bayard
Fort Wingate
Fort Whipple
Fort Yuma
Fort Mojave
Fort Tejon
Fort Bidwell
Fort Klamath
Fort Boise
Fort Lapwai
Fort Assiniboine
Fort Shaw
Fort Missoula
Fort Ellis
Fort Custer
Fort Keogh
Fort Stevenson
Fort Buford
Fort Totten
Fort Pembina
Fort Snelling
Fort Abercrombie
Fort Wadsworth
Fort Sisseton
Fort Randall

Chart III. Precipitation, May, 1885

Form 106 F.

Chart III. Precipitation, May, 1885


Scale of Shades
From 0 to 2 inches
" 2 " 4 "
" 4 " 6 "
" 6 " 8 "
Over 8 "
WAR DEPARTMENT WEATHER MAP
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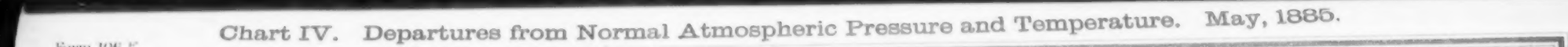
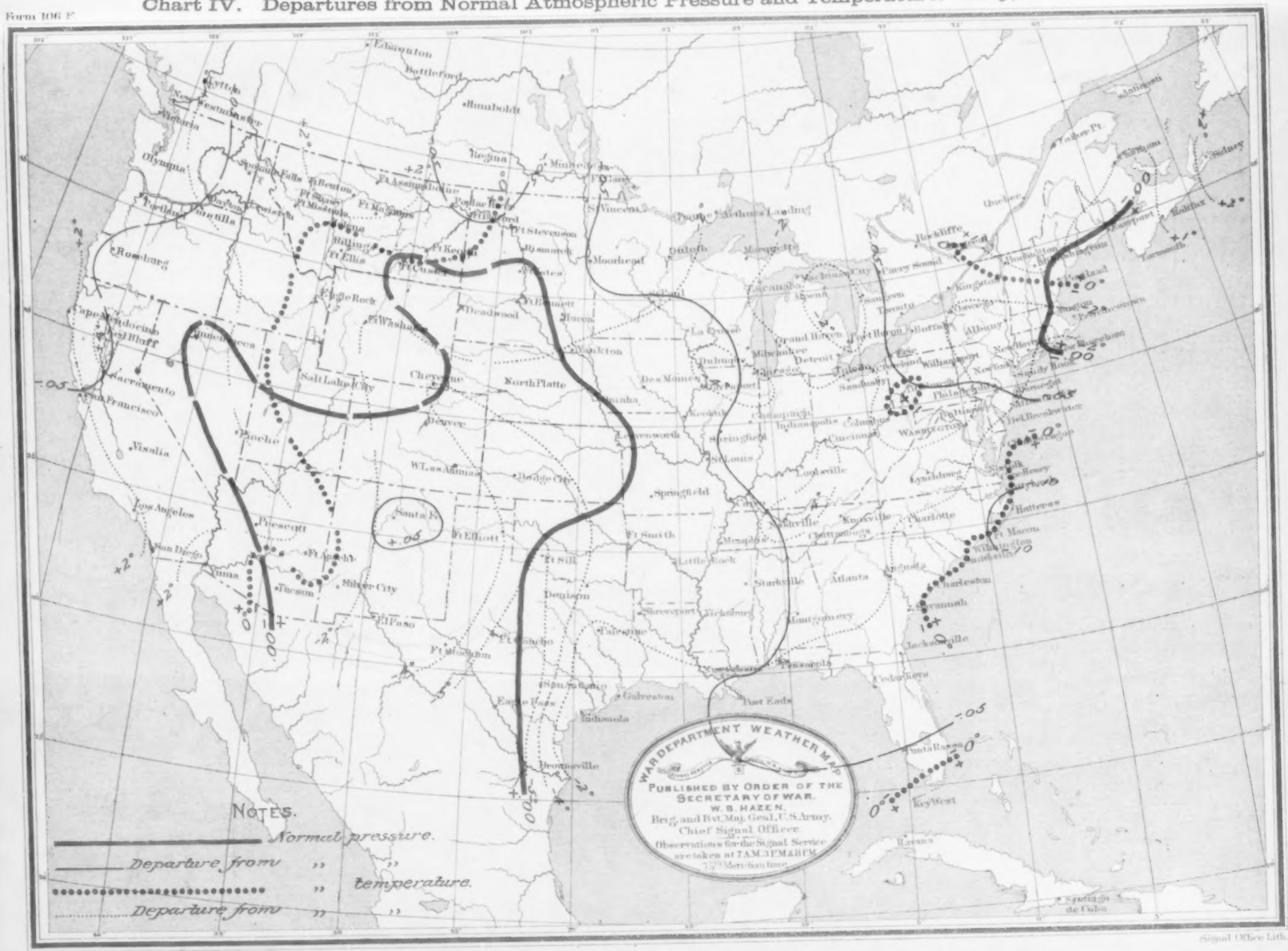
W. B. HAZEN,
Brig. and Bvt. Maj. Genl. U.S. Army.
Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. 75th Meridian time.
Signal Office Lith.

Chart IV. Departures from Normal Atmospheric Pressure and Temperature. May, 1885.



Form 106 F.

Chart IV. Departures from Normal Atmospheric Pressure and Temperature. May, 1885.


WAR DEPARTMENT WEATHER MAP
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Brig. and Bvt. Maj. Genl. U.S. Army.
Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. 75th Meridian time.
NOTES.
Normal pressure.
Departure from " "
" temperature.
Departure from " "
Signal Office Lith.

Voluntary observers of the Signal Service, on land, from whom meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for May, 1885.

Observer and place of observation.

Anderson, Dr. W. W., Stateburg, S. C.
Altaffer, J. M., Independence, Kans.
Adams, Dr. O. H., Vineland, N. J.
Abbott, Dr. E. K., Salinas City, Cal.
Alexander, S., Birmingham, Mich.
Arents, Hiram, Oroville, Cal.
Bennett, Geo. Bandon, Oreg.
Beloit College, Beloit, Wis.
Bell, Joseph, Franklin, Pa.
Brainerd, Dr. H. G., Independence, Iowa.
Baker, Dr. Henry B., Lansing, Mich.
Beall, Dr. R. L., Lenoir, N. C.
Brendel, Dr. Fred., Peoria, Ill.
Bentley, David, Princeton, Cal.
Bowman, Peter, Ruggles, Ohio.
Boerner, Prof. Chas. G., Vevay, Ind.
Bartlett, E. B., Vermillion, N. Y.
Baldwin, A. L., Bethel, Conn.
Bardsley, Jas. G., Nephi, Utah.
Briggs, John, Albany, Oreg.
Betts, Prof. Arthur, Webster, Dak.
Breed, J. E., Embarras, Wis.
Baker, Dr. L. J., Ottumwa, Iowa.
Boies, Lieut. A. H., Hudson, Mich
Boyd, Joseph, Oskaloosa, Iowa.
Beebe, A., Manistique, Mich.
Bryant, A. F., Yutan, Nebr.
Blachly, C. P., Manhattan, Kans.
Barney, Wm., Stowe, Vt.
Beecher, Chas., Wysox, Pa.
Charbonnier, Prof. L. H., Athens, Ga.
Cook, S. A., Milledgeville, Ga.
Cotton, Dr. D. B., Portsmouth, Ohio.
Clark, A. C., Wausau, Wis.
Casey, Geo., Auburn, N. Y.
Crawford, E. A., Liberty Hill, La.
Curtiss, G. G., Fallston, Md.
Cornell University, Ithaca, N. Y.
Cocke, A. R., Indianola, Iowa.
Cutting, Hiram A., Lunenburg, Vt.
Crosier, Adam, Laconia, Ind.
Caulkins, John S., Thornville, Mich.
Clark, T. A., Weldon, N. C.
Carleton College, Northfield, Minn.
Chandler, Dr. W. J., South Orange, N. J.
Cass, John J., Allison, Kans.
Chase, Pliny E., Haverford College, Pa.
Comstock, Prof. F. M., Le Roy, N. Y.
Cochran, Wm. P., Clay Centre, Kans.
Calhoun, P. B., Austin, Tenn.
Carpenter, Dr. W. B., Leavenworth, K.
Christ, Jacob, Franklin, Wis.
Cheney, Wm., Minneapolis, Minn.
Cox, Prof. T. E., Emmitsburg, Md.
Caffee, Wm. K., Carthage, Mo.
Collin, Prof. Alonzo, Mt. Vernon, Iowa.
Cooper, Dr. Geo. C., Manatee, Fla.
Cleveland, Dr. G. H., Moorestown, Mich.
Clayton, H. H., Ann Arbor, Mich.
Corbin, F. E., Dudley, Mass.
Chubbs, Thos H., Post Mills, Vt.
Capen, F. S., Waterville, Me.
Cole, Seward, Cahuenga, Cal.
Cutler, B. B., Heath, Mass.
Chapin, Adams, Poway, Cal.
Childs, W. A., Brattleborough, Vt.
Carpenter, Prof. L. G., Lansing, Mich.
Carter, Rev. Dr. W. H., Tallahassee, Fla.
Couch, E. D., Contoocook, N. H.
Davis, Jacob, Rowe, Mass.
Dickinson, Jas. R., Guttenberg, Iowa.
Deming, H. D., Wellsboro, Pa.
Dozier, Wm., Mattoon, Ill.
Dewhurst, Rev. E., Voluntown, Conn.
Day, Theodore, Dyberry, Pa.
Dawson, Wm., Spiceland, Ind.
Dunton, Lieut. W. R., Dorset, Vt.
Dunlap, W. L., Tecumseh, Nebr.

Observer and place of observation.

Dow, Roswell, Sycamore, Ill.
Dudley, C. B. Altoona, Pa.
Doton, Hosea, Woodstock, Vt.
Dunlap, J. B., Charleston, Ill.
Dechant, Wm. H., Mahanoy Plane, Pa.
Douglas, Dr. B. H., Asheville, N. C.
David, V. E., Buchanan, Mich.
Eliason, W. A., Statesville, N. C.
Eckstein, Rev. M., Conception, Mo.
Ellis, John, Marquette, Nebr.
Ellsworth, W. W., Hartford, Conn.
Elliott, Rev. J. C., Swanwick, Ill.
Everett, Dr. J. T., Clyde, Ohio.
Ewell, Dr. M. D., South Evanston, Ill.
Fernald, Prof. M. C., Orono, Me.
Ferris, B. F., Sunman, Ind.
Fouch, Dr. A., College City, Cal.
Fuller, E. N., Tacoma, Wash. T.
Flick, Prof. J. H., Warrenton, Mo.
Friend, Chas. W., Carson City, Nev.
Failyer, Prof. G. H., Manhattan, Kans.
Fleming, J., Readington, N. J.
Gates, W. B., Burlington, Vt.
Grathwohl, John, Blooming Grove, Pa.
Gillingham, Milnor, Fallsington, Pa.
Gardiner, R. H., Gardiner, Me.
Gowey, H. D., North Lewisburg, Ohio.
Gibson, John H., Salina, Kans.
Green, Dr. Jesse C., West Chester, Pa.
Gerrish, S. H., Sacramento, Cal.
Gray, J. W., Stockham, Nebr.
Goodwin, Wm., North Colebrook, Conn.
Geddings, Dr. W. H., Aiken, S. C.
Gregory, J. W., Sherlock, Kans.
Gordon, Dr. G. G., Swartz Creek, Mich.
Gray, F. R., Yates Centre, Kans.
Gillingham, W., Accotink, Va.
Garlick, Rev. Dr. J. R., Bruington, Va.
Gray, Capt. A. W., Kenewick, Wash. T.
Heath, E. R., Wyandotte, Kans.
Horn, Dr. H. B., Atchison, Kans.
Hiram College, Hiram, Ohio.
Harvard College Observatory, Cambridge, Mass.
Hammitt, John W., College Hill, Ohio.
Heaton, Isaac E., Fremont, Nebr.
Helm, Thos. B., Logansport, Ind
Hoskinson, R. M., Bainbridge Island, Wash Ter.
Hunter, Dr. T. C., Wabash, Ind.
Haywood, John, Westerville, Ohio.
Hyde, G. A., Cleveland, Ohio.
Hassler, B. K., Chambersburg, Pa.
Hartzler, J. A., Mottville, Mich.
Hall, J. B., Worcester, Mass.
Hager, Mrs. L. G., Terre Haute, Ind.
Howe, Prof. J. L., Richmond, Ky.
Hoyt, F. C., Easton, Pa.
Houghton Farm Experiment Station, Mountainville, N. Y.
Heatwole, L. J., Dale Enterprise, Va.
Heacock, J. L., Quakertown, Pa.
Hazen, Rev. A., Deerfield, Mass.
Harris, W. C., Dover, N. J.
Hickman, E. A., Independence, Mo.
Harper, Geo. W., Cincinnati, Ohio.
Hodge, Rev., F. B., Wilkes Barre, Pa.
Housekeeper, H. S., S Bethlehem, Pa.
Humphrey, Dr. L., Fairbury, Nebr.
Howland, Mrs. W. P., Jefferson, Ohio.
Hurlin, Rev. Wm., Antrim, N. H.
Harris, T. C., Raleigh, N. C.
Hurley, J. M., Lancaster, Wis.
James, John W., Marengo, Ill.
Jones, Dr. E. U., Taunton, Mass.
Jordan, Dr. M. D. L., Milan, Tenn.
Jones, Ira B., Neillsville, Wis.

Observer and place of observation.

Jones, F. M., Puerto de Luna, N. Mex.
Knapp, J. G., Limona, Fla.
Keese, G. Pomeroy, Cooperstown, N. Y.
Kuhne, F. W., Fort Wayne, Ind.
Keeler, W. F., Mayport, Fla.
Kirkwood, E., Mauzy, Ind.
King, W. R., Yellow Springs, Ohio.
Kent, Miss E., Phillipsburg, N. J.
Lueps, Miss Johanna, Manitowoc, Wis.
Lincoln, A. T., Marion, Va.
Loomis, J. C., Jeffersonville, Ind.
Lay, Dr. F. H., Pueblo, Colo.
Lucas, Dr. G. L., Albion, Idaho.
Luther, S. M., Garrettsville, Ohio.
Ladshaw, Geo. E., Pacolet, S. C.
Loud, Prof F. H., Colorado Springs, Colo.
Lovewell, Prof. J. T., Topeka, Kans.
McDonogh Institute, McDonogh, Md.
McCready, Miss L. A., Fort Madison, Iowa.
Moore, C. R., Bird's Nest, Va. [Iowa.
Munn, A. M., Kalamazoo, Mich.
Metcalf, Dr. John G., Mendon, Mass.
Micklem, J. Howard, Variety Mills, Va.
Meehan, Thos., Germantown, Pa.
Moore, Nathan, Grampian Hills, Pa.
Mikesell, Thos., Wauseon, Ohio.
McPherson, Wm., San Rafael, Cal.
McClintock, F., West Union, Iowa.
Marshall, G., Cresco, Iowa.
Mitchell, Dr. D. W., Harrisville, Mich.
Miller, H. D., Drifton, Pa.
McNeill, M., Princeton, N. J.
Morehead, J. F., Wytheville, Va.
Moore, Dr. J. W., Easton, Pa.
Neal, Dr. J. C., Archer, Fla.
Newbegin, John D., Anna, Ill.
Nelson, P. P., Northport, Mich.
Newcomb, G. S., Westborough, Mass.
Nourse, H. D., Washington, D. C.
Noll, A. B., Somerville, N. J.
Nicholson, Dr. A. W., Boyne, Mich.
Nordberg, A., Richardton, Dak.
Norcom, Prof. T. J., Ruffin, N. C.
Osborn, Dr. Thos. C., Cleburne, Tex.
Olds, H. D., Cedar Rapids, Iowa.
Owsley, Dr. J. B., Jacksonborough, O.
Otis, H. G., Washington, Pa.
Pearce, Thomas, Eola, Oreg.
Pierson, Rev. J., Ionia, Mich.
Powrie, W., Sussex, Wis.
Parrish, Geo. W., Ellensburg, Wash. T.
Patterson, Wm., Salem, N. J.
Partrick, J. M., North Volney, N. Y.
Purdue University, La Fayette, Ind.
Pettersén, Dr. F., Comfort, Tex.
Pritchett, H. C., Huntsville, Tex.
Prosser, Chas. S., Ithaca, N. Y.
Remington, C. V. S., Fall River, Mass.
Robertson, T. D., Rockford, Ill.
Rogers, F. M., Luling, La.
Renfrew, H. N., Wilton Center, Ill.
Rodman, Thos. R., New Bedford, Mass.
Rerick, R. H., La Grange, Ind.
Rotch, A. L., Blue Hill, Mass.
Russell, Geo. W., Wellsburg, W. Va.
Runge, C., New Ulm, Tex.
Rivers, C. M., Oswego, Kans.
Shaw, J., Chester, Minn.
Shriver, E. T., Cumberland, Md.
Seltz, Chas., De Soto, Nebr.
Scott, Thos. G., Forsyth, Ga.
Stucky, Dr. C. T., Helvetia, W. Va.
Stern, Jacob T., Logan, Iowa.
Slade, Elisha, Somerset, Mass.
Slenker, Mrs. E. D., Snowville, Va.
Scribner, H. F. J., Strafford, Vt.
Shriver, Howard, Wytheville, Va.

Observer and place of observation.

Smith, H. D., Monticello, Iowa.
Safford, A. T., Williamstown, Mass.
Sherman, W. B., Manchester, Iowa.
Smith, Rev. D. W., Troy, Pa.
Staudenmayer, Dr. L. R., Lincolnton, N. C
Snell, Miss S. C., Amherst, Mass.
Shaw, E., Maud, Kans.
Sim, John R., Summit, Va.
Sommerville, W. B., Birmingham, Ala.
Shepard, E. M., Springfield, Mo.
Starr, Prof. F., Cedar Rapids, Iowa.
Sadler, Prof. H. E., Emporia, Kans.
Spilman, J. J., Pierce City, Mo.
Stone, W. E., Amherst, Mass.
Sargent, J. B., Leicester, Mass.
Swezey, Prof. G. D., Crete, Nebr.
Sullivan, J. F., Braddock, Colo.
Snow, Prof. F. H., Lawrence, Kans.
Sacred Heart College, Prairie du Chien, Wis.
Trembley, Dr. J. B., Oakland, Cal.
Todd, Prof. David P., Amherst, Mass.
Teele, Rev. A. K., Milton, Mass.
Truman, Geo. S., Genoa, Nebr.
Turnbo, Silas C., Pro Tem, Mo.
Tillinghast, C. B., Albany, N. Y.
Turner, Ernest, Point Pleasant, La.
Tyrrel, A. C., Madison, Nebr.
Thompson, R. J., Tiffin, Ohio.
Upton, Prof. W., Providence, R. I.
Voegeli, Adolphus, Des Moines, Iowa.
Washburne Observatory, Madison, Wis.
Wild, Rev. E. P., Newport, Vt.
Williams, Rev. C. F., Ashwood, Tenn.
Wing, Miss M. E., Charlotte, Vt.
West, Silas, Cornish, Me.
Went, E. C., Frankfort, Ky.
Wylie, Wm., Mount Forest, Canada.
Walton, J. P., Muscatine, Iowa.
Wait, S. E., Traverse City, Mich.
Woodstock College, Woodstock, Md.
Wolfe, John H., Wellington, Kans.
West, Dr. Jos. O., Princeton, Mass.
Washington Aqueduct. { Receiving Reservoir, D. C / Distributing " / Great Falls Reservoir, Md / Rock Creek Bridge, D. C.
Winipisseogee Lake Cotton and Woolen Manufacturing Co. { Weir's Bridge, N. H. / Woodstock, N. H. / Wolfborough, N. H. / Lake Village, N. H. / Bristol, N. H. / Belmont, N. H. / Ashland, N. H.
Willis, O. R., A. M., Ph. D., White Plains, N. Y.
Williams, Dr. A. C., Elk Falls, Kans.
Wigg, Dr. Geo., East Portland, Oreg.
Woods, Mrs. Dr. A. G., Maynard, Iowa.
Wetmore, E. L., Tucson, Ariz.
Wright, J. W. A., Greensboro, Ala.
Watson, Dr. S. T., Nayatt Point, R. I.
Wadsworth, Dr. J. L. R., Collinsville, Ill.
Watson, Evan, Fort Scott, Kans.
Widman, Rev. C. M., Grand Coteau, La.
Wistrom, M. F., Harvard, Nebr.
Winn, Rev. T. S., Green Springs, Ala.
Ward, J. B., Guilford, Ind.
Whitney, Chas. E., Humphrey, N. Y.
Whitmore, J. E., Gallinas Spring, N. Mex.
Whittington, G., Mount Ida, Ark.
Watters, Dr. J., Westmoreland, Kans.
Yetter, Wm. G., Catawissa, Pa.
Yates, T. P., Factoryville, N. Y.
Young, Geo. R., Penn Yan, N. Y.
Yarborough, T. B., Honey Grove, Tex.
Zimmerman, F. C., Bunker Hill, Ill.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for May, 1885.

Alcatraz Island, Cal.
Angel Island, Cal.
Assinaboine, Fort, Mont.
A. Lincoln, Fort, Dak.
Benicia Barracks, Cal.
Brady, Fort, Mich.
Bridger, Fort, Wyo.
Brown, Fort, Tex.
Barrancas, Fort, Fla.
Concho, Fort, Tex.
Columbus, Fort, N. Y.
David's Island, N. Y. H.
Ellis, Fort, Mont.
Fred Steele, Fort, Wyo.
Gaston, Fort, Cal.
Hamilton, Fort, N. Y.
Klamath, Fort, Oreg.
Keogh, Fort, Mont.
Lyon, Fort, Colo.
Lewis, Fort, Colo.
Mason, Fort, Cal.
Madison Barracks, N. Y.
McDermitt, Fort, Nev.
Monroe, Fort, Va.
McHenry, Fort, Md.
Mount Vernon B'ks, Ala.
McDowell, Fort, Ariz.
Meade, Fort, Dak.
Niagara, Fort, N. Y. [Cal.
Presidio of San Francisco,
Plattsburg Barracks, N. Y.
Pembina, Fort, Dak.
Preble, Fort, Me.
Randall, Fort, Dak.
Robinson, Fort, Nebr.
Snelling, Fort, Minn.
Saint Augustine, Fla.
Sully, Fort, Dak.
Sisseton, Fort, Dak.
Shaw, Fort, Mont.
Totten, Fort, Dak.
Townsend, Fort, Wash. T
Union, Fort, N. Mex.
Wingate, Fort, N. Mex.
Yates, Fort, Dak.

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for May, 1885.

Alabama State Weather Service, under direction of Prof. P. H. Mell, Jr., Auburn, Alabama.
Georgia State Weather Service, under direction of Hon. J. T. Henderson, Atlanta, Ga.
Missouri State Weather Service, under direction of Prof. Francis E. Nipher, Saint Louis, Mo.
Nebraska State Weather Service, under direction of Prof. Goodwin D. Swezey, Crete, Nebraska.
Indiana Volunteer Weather Service, under direction of Prof. W. H. Ragan, Greencastle, Indiana.
Indiana State Weather Service, under direction of Prof. H. A. Huston, La Fayette, Indiana.
Ohio State Weather Service, under direction of Prof. T. C. Mendenhall, Columbus, Ohio.
Tennessee State Weather Service, under direction of Hon. A. J. McWhirter, Nashville, Tennessee.
Minnesota State Weather Service, under direction of Prof. W. W. Payne, Northfield, Minnesota.
Iowa State Weather Service, under direction of Prof. Gustavus Hinrichs, Iowa City, Iowa.
Louisiana State Weather Service, under direction of Mr. Robt. S. Day, New Orleans, La.
New England Meteorological Society: Prof. Winslow Upton, of Providence, director; Mr. W. M. Davis, of Cambridge, secretary.
Data have also been used from meteorological records of the Central Pacific and Southern Pacific railway companies.

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do.	maximum registering		5.00	do.	.60
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